DIETETICS FOR NURSES

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TO

MISS ADELAIDE NUTTING,

SUPERINTENDENT OF THE JOHNS HOPKINS TRAINING SCHOOL.

DEAR MISS NUTTING:—

We take great pleasure in inscribing this little book to you in appreciation of the splendid work you are doing in maintaining a high standard for the nursing profession.

Very sincerely,

JULIUS FRIEDENWALD,
JOHN RUHRÄH.

PREFACE TO THE THIRD EDITION.

SINCE the second edition of this book was published there have been a number of advances made in the science of dietetics, and short accounts of the more important of these have been included in this new edition. The principal additions are in the articles on feeding infants, on typhoid fever, scarlet fever, and rectal and duodenal alimentation. Various changes have been made in the section on the diseases of the stomach and intestine. We trust that this volume may meet with the same cordial reception that has been given its predecessors.

PREFACE.

THIS little book has been prepared to meet a need in the training-school and as a handbook for nurses and laymen who are interested in the subject of feeding the sick.

At present the nurse must rely upon a knowledge of dietetics gleaned either from her text-book on invalid cookery or from one of the larger reference works upon the subject. The former contains too little, and the latter is much too large and too technical to be of great service to the busy nurse.

The aim of this book is to give the essentials of dietetics. The physiology of digestion has been briefly reviewed. The various classes of foods and the part they play in nutrition have been considered. The subjects of infant feeding and the feeding of the sick have been fully discussed, and a brief outline has been given of the principles involved in the nourishment of patients suffering with the various diseases in which diet plays an important part in the management. Rectal alimentation and the feeding of operative cases have been fully described. Diet lists and instructions have been added which should enable the nurse to comprehend and to intelligently carry out the orders of the physician. A

large number of recipes for the invalid's dietary have been added.

Should the reader desire further information on any of the subjects mentioned or concerning other dietetic topics he should consult our larger work, "Diet in Health and Disease."

CONTENTS.

CHAPTER I.

CHAPTER II.

CHAPTER III.

CHAPTER IV.

CHAPTER V.

CHAPTER XXI.

CHAPTER XXII.

CHAPTER XXIII.

DIETETICS FOR NURSES.

CHAPTER I.

THE CHEMISTRY AND PHYSIOLOGY OF DIGESTION.

FOOD is the matter taken into the body to supply heat and energy, to build up the body, and repair tissue waste.

Every movement we make uses up a certain amount of energy; this and all the heat that is dissipated from our bodies must be supplied by the food. The energy in the food is present in a resting or latent form in the power which binds atoms together in molecules and the molecules together into a mass. When the complex food forms are broken up into simpler compounds this energy is set free and is used by the body as energy or converted into heat. The excess is stored up in the body, usually as fat, in the subcutaneous tissue, or as glycogen in the liver and muscles. This energy is liberated by a series of changes which may be compared to the burning of coal or wood in a furnace, the difference being that the chemic changes are much more complicated, and the body is a much more perfect furnace than any which man has devised, as it can utilize a greater proportion of energy with much less waste.

The structures of the body—bones, muscles, nerves, etc.—are built up after birth by material which is taken into the body as food. The wear and tear of the body

necessitates continual repair of these tissues, and the material used for this also comes from the food.

Food, as it is taken into the body, differs very much in composition from the material that can be utilized by the tissues in growth and the repair of waste. The processes which prepare it for the use of the body are spoken of as *digestion.*

The chemic elements contained in the body are also found in the food. Some fifteen elements are present in the body, the principal ones being oxygen, hydrogen, carbon, nitrogen, calcium, phosphorus, and sulphur. The compound substances which these make are classified under the headings, protein, fats, carbohydrates, mineral matter or salts, and water.

Water.—Water enters into the composition of every tissue in the body and forms over 60 per cent. of the entire body-weight. It is not burnt up, however, and so does not supply any energy.

Salts.—These form about 6 per cent. of the weight of an adult man. They are present in the bones, teeth, and other tissues. The principal salts of the body are calcium phosphate and the various compounds of potassium, sodium, magnesium, and iron. The mineral salts are very necessary to life and health.

Protein.—Under this heading are included most of the food-stuffs containing the element nitrogen. Protein is found in both animal and vegetable food, familiar examples of it being the lean and gristle of meat, the white of egg, the gluten of wheat, and the curd of milk. The word "proteid" is used by some writers to describe these. The proteins are often subdivided into *albuminoids,* as the white of egg and the curd of milk; *gelatinoids,* as gelatin; and extractives, such as the aromatic substances in beef-tea.

The proteins are necessary for life. They are the only form of food which can build up and repair the body, if we except the fatty tissues, which may be replaced by protein, carbohydrate or fat. They also supply energy and heat. If they are not supplied in sufficient quantity the body will waste and a condition of malnutrition come on.

Carbohydrates contain no nitrogen. They are composed of carbon, hydrogen, and oxygen, the last two in the proportion to form water, hence the name carbohydrate. They include starch, sugar, and the vegetable fiber or cellulose. Carbohydrates are burnt up in the body and are the most important source of heat and energy. Excesses taken are converted into fat and stored up in the body. The superficial fat of the body protects it from cold and acts as a storehouse for the fat, which can be converted into heat and energy.

Fat, or hydrocarbon, is an important element of food, serving the same purpose as the carbohydrates. Fat supplies more heat and energy, weight for weight, than carbohydrates, but is neither so easily digested nor so available. Fat is found in animal and vegetable food, as in the fat part of meat, butter, olive oil, and is present in large quantities in the yolk of egg.

Atwater gives the following table to illustrate the uses of the different food elements:

Nutritive Ingredients of Food.

Food as purchased contains—	Edible portion—*e. g.*, flesh of meat, yolk and white of egg, wheat, flour, etc.	Water.	
		Nutrients.	Protein. Fats. Carbohydrates. Mineral matter.
	Refuse—*e. g.*, bones, entrails, shells, bran, etc.		

Uses of Nutrients in the Body.

Protein—forms tissues—*e. g.*, white (albumin) of eggs curd (casein) of milk, lean meat, gluten of wheat, etc. Fats—are stored as fat—*e. g.*, fat of meat, butter, olive oil, oils of corn, wheat, etc. Carbohydrates—are transformed into fat—*e. g.*, sugars, starches, etc. Mineral matters (ash)—share in forming bone, assist in digestion—*e. g.*, phosphates of lime, etc., potash, soda, etc.	All serve as fuel to yield energy in the forms of heat and muscular power.

The changes which take place in the body in "burning up" the food material are designated by the name *metabolism.*

The heat value of the various foods may be determined by the use of an instrument known as a bomb calorimeter, the result being expressed in *calories.* A calorie is the amount of heat that is necessary to raise the temperature of one kilogram of water 1° C. It is nearly the same as the amount required to raise one pound of water 4° F. This expressed in the mechanical force, that is, the amount of work it would do, means that a calorie would raise a ton about 1.54 feet, or that it is equal to 1.54 foot tons. Some authors use *gram* calories, and their figures are 1000 times greater than those in most general use.

According to Atwater, the fuel-value of the various classes of food as ordinarily supplied is as follows:

1 gram of	protein	= 4 calories;	1	pound = 1820	calories.
1 "	fat	= 8.9 " ;	1	" = 4040	"
1 "	carbohydrate	= 4 " ;	1	" = 1820	"

These figures are somewhat lower than the figures given by older estimations, and are based upon the most recent experiments. The fuel-values formerly given were: protein and carbohydrates, 4.1 calories per gram; fat, 9.3 calories per gram. It will be observed that fat has a

very high food-value, which doubtless explains why it is stored up as a reserve fuel.

The amount of energy used in mental work has never been determined. In an experimental chamber, where as slight an exertion as turning over in bed will be registered by the thermometric scale, no change was produced by the inmate working out the most difficult mathematic problems.

DIGESTION AND ABSORPTION.

The digestion of food takes place through a number of changes brought about by the action of a number of ferments or, as they are often called, *enzymes*. The food is so changed that the useful part can be absorbed and used by the body, while the remainder is passed off as refuse.

Enzymes are supplied by a number of glands, as ptyalin in the saliva, pepsin in the gastric juice, and trypsin in the intestine. There are enzymes which change starch into sugar, some which change protein into soluble substances, others which break up fats, still others acting on sugars, etc. The chemistry of these changes is usually that the enzyme causes the food substance to unite with water and separate into two simpler compounds.

On being taken into the mouth the food is broken up by chewing and mixed with the salivary juice, which acts on the starches and changes them into sugar. The chemic reaction of the saliva is alkaline. The food then passes into the stomach. The chemic reaction of the stomach or gastric juice is acid, and the action of the salivary juice is soon stopped. In the stomach the food is liquified and the proteins changed into peptones by the action of the *pepsin*. Milk is curdled by the action of

another enzyme—*rennin*. Appetite is a great factor in the secretion of the gastric juice, as Pawlow and others have shown. Food introduced without the knowledge of the individual is not digested as rapidly, nor as much gastric juice secreted, as when the appetite has been excited. After digestion has begun there are certain substances which cause a second and more uniform flow of gastric juice. These have been called hormones. The bodies which most easily cause this flow of gastric juice are the products of protein digestion, so that where the flow has been started by appetite it goes on more satisfactorily. Meat juices also contain such substances, and meat soups or broths are, therefore, very useful in stimulating the flow of gastric juice. After from one to several hours, according to the quality and quantity of food taken, the liquid mixture in the stomach is passed into the intestines. Here the reaction is alkaline. A number of different juices act on the food at the same time. The liver supplies bile, the pancreatic gland a juice, the intestinal glands a secretion.

The pancreatic juice contains several enzymes: *trypsin*, which acts like pepsin; *amylopsin*, which acts like ptyalin, so that the digestion commenced in the mouth and stomach is completed. It also contains *steapsin*, which acts on the fats, emulsifying them, that is, dividing them into little droplets like cream or a cod-liver oil emulsion, and also splitting the fats into glycerin and fatty acids. The bile from the liver assists in emulsifying fat and exerts an influence over the food, hindering putrefaction. The intestinal juices aid in emulsifying fats, and act upon the starches and sugars.

Absorption.—This occurs in two ways: either by the material absorbed entering directly into the blood through the capillaries in the intestines, and passing

thence through the portal veins, or it is absorbed by little vessels in the lining of the intestine called lacteals, and from these it passes through the thoracic duct, a long tube connecting them with the veins (left jugular and subclavian), returning the blood from the upper part of the body. The food material in the second case enters directly into the blood-current. Little or no absorption takes place in the stomach. The food enters the small intestine in a liquid condition and remains from 5 to 20 hours, and is then passed into the large intestine, where the excess of water is absorbed and the refuse or feces passed off in a more or less solid form.

Almost all the absorption of food takes place in the small intestine. The large intestine may absorb food under certain conditions, as when it is injected into the bowel (see Rectal enemata).

The liver plays an important part in nutrition. It supplies bile, but that is a small matter compared to what is called its glycogenic function. The carbohydrate food, on reaching the liver, is changed to *glycogen* or animal starch. This glycogen is stored up in the liver and also in the muscles, and is burnt up in muscular action. The liver also takes care of the waste formed by the changes taking place in the body. These waste products are brought to the liver by the blood and changed into compounds which can be passed off from the body. There are a number of waste products, most important of which is *urea*, which may also be formed in the muscles. This urea enters the blood-stream and is passed off by the kidneys.

The Digestion of Infants.—The salivary digestion is very feeble in early life. The salivary glands are fairly active by the fourth month, and begin to play a more important rôle in the digestion about the eighth or ninth

month. The stomach digestion is of less importance in infancy. One of the principal changes is the coagulation of the casein (curd) of milk.

THE RELATION OF FOOD TO VARIOUS CONDITIONS.

Heredity.—Certain diseases or conditions which are affected by diet are apt to run in families, the most important of these are obesity, gout, diabetes, and alcoholism. Food idiosyncrasies may be often inherited, as the urticaria (hives) caused by eating strawberries or shellfish.

Sex.—Women, as a rule, require about four-fifths as much food as men, this may partly be due to the sedentary life led.

Age.—Children require proportionately more food than adults. Atwater gives the following table of food requirements:

Boy of 15–16	years requires	0.9	the	food of a man	at moderate work.
Girl of 15–16	"	0.8	"	"	"
Boy of 13–14	"	0.8	"	"	"
Girl of 13–14	"	0.7	"	"	"
Boy of 12	"	0.7	"	"	"
Girl of 10–12	"	0.6	"	"	"
Boy of 10–11	"	0.6	"	"	"
Child of 6–9	"	0.5	"	"	"
Child of 2–5	"	0.4	"	"	"
Child under 2	"	0.3	"	"	"

Old people require less than vigorous adults.

Race and Climate.—Various races use different diets, depending much on the climate they live in. Climate affects the diet largely by the supply it affords. More fat is required in cold climates and during cold weather than in warm. The well clad require less food than those exposed to cold.

Size and Weight.—Other things being equal, the larger the body the more food is needed.

Rest and Exercise.—Much less food is required during rest than during exercise. In exercise the muscular activity increases oxidation and tissue waste, and this waste must be counterbalanced by an increased consumption of food.

Individual tendencies have some effect on the amount of food required. Some persons are obese and eat but little, and *vice versa*.

THE INFLUENCE OF VARIOUS FACTORS UPON THE DIGESTION.

Apart from the selection of a proper diet, important factors that especially affect the digestion are the following: 1. The hours, order, and frequency of meals. 2. Variety in diet. 3. The appetite. 4. The temperature of food. 5. Rest and exercise before and after meals. 6. Emotion.

1. **Order and Frequency of Meals.**—It is usually customary to fix certain hours for taking of meals; these hours vary with the occupation of the individual. In large cities, where the noon hour is taken up largely with active business pursuits, evening is selected as the most convenient hour for dinner. Sir Henry Thompson states that three general systems are in use, according to which two, three, or four meals are taken daily. The first system, which consists of two meals a day, is followed in France and other countries on the continent of Europe. A substantial meal, consisting of fish or meat and other courses of solid food, is eaten about noon; no food is taken before the noon meal, except on arising, when a cup of coffee or chocolate and a small quantity of bread and butter are taken. The second meal, which is dinner, is eaten between 6 and 7 o'clock in the evening. This meal is the largest meal of the day, and consists of soup,

fish, meat, vegetables, salads, dessert, and black coffee. The second system, commonly in vogue in England, consists of four meals daily. The first meal, or breakfast, is taken at about 8 A. M., and consists of cocoa, tea or coffee, bread, butter, bacon, fish, or eggs; dinner is eaten between 1 and 2 P. M. and consists of soup, meat, fish, vegetables, and pudding; tea is taken at 5 P. M., and supper is served at 8 P. M., and consists of meat, fish, vegetables, and stewed fruits. Dinner is taken in the evening by the well-to-do classes, and a substantial lunch is usually taken at noon. The third system, practised in this country, consists in taking three meals daily. In many towns it is customary to dine at noon; in others, in the evening. The usual breakfast, taken between 7 and 8 A. M., consists of fruits, breakfast food or cereals, eggs, bacon or salt fish, tea, cocoa or coffee, and bread and butter. Luncheon, eaten between 12.30 and 2 o'clock, consists of cold meat or a chop, vegetables, salads, and dessert. Dinner, eaten between 6.30 and 8 P. M., is the heaviest meal of the day, and consists of soup, fish, meats, vegetables, salads, and fruit.

The frequency of meals must be regulated according to individual conditions. Patients suffering from digestive disturbances and those who take very small quantities of food at a time require nourishment at frequent and regular intervals; whereas, those whose digestion is feeble, should allow six or seven hours to elapse between meals; ordinarily the intervals between meals should be about four or five hours, this being about the time necessary for complete digestion of a mixed meal in the stomach. The habit of habitually omitting the noon luncheon, so commonly practised by busy Americans, should be discouraged.

2. **Variety of Diet.**—In order thoroughly to satisfy

the needs of the body the diet must be varied. Although a diet restricted to but a few articles of food may contain a sufficient quantity of the alimentary principles to sustain the body nutrition, yet the monotony of such a diet becomes so objectionable that it cannot be digested thoroughly. With a mixed diet the same person will digest a larger proportion of nutrients than with a diet composed of a single food material. Certain races restrict the variety of food from religious motives, such as the Jewish restriction of ham, pork, and oysters.

3. **Appetite.**—Appetite is the desire for food, and is dependent upon various conditions. It is controlled by the sensation of hunger, and is often induced by the sight, smell, and taste of food. Simple bitters or some form of alcoholic drink will at times induce this sensation. The appearance of badly prepared or improperly served food will often dispel the appetite. In children the appetite is usually good, whereas in the aged it is lessened. Some persons have voracious appetites and abnormal craving for food. This is often the case in diabetic and other conditions, when, at times, the appetite cannot be satisfied.

4. **Temperature of Food.**—The temperature of food when taken is of considerable importance. The ideal temperature is that of the body, from 98° to 100° F. (Uffelman). The limits of safety being between 45° and 130° F. According to Hutchison, extremes of temperature of food are apt to give rise to gastric disturbances, such as gastric catarrh. Uffelmann states that a drink at a temperature of 122° F. increases the body-temperature 0.1 to 0.3° C. It is believed by many that ulcer of the stomach, so common in cooks, is often due to the taking of too hot foods.

5. **Rest and Exercise Before and After Meals.**—It is often advisable to rest, but not to sleep, after meals. The larger part of the work of the stomach should be completed before retiring at night, otherwise the sleep is apt to be disturbed. About one to two hours should be allowed to elapse between a light evening meal and bedtime, and three to four hours between a heavy meal and sleep. From personal observations the authors have concluded that digestion is improved by rest after meals, but impaired by sleep. In many instances a period of rest before eating meals is a valuable aid to digestion. Violent exercise immediately after meals inhibits digestion, whereas moderate exercise one or two hours after meals materially aids this process.

6. **Food and Emotion.**—Severe mental strain and strong emotion disturb the digestion, and for this reason food should not be taken until a period of rest and composure has intervened. On the other hand, pleasurable sensations aid the digestion, and pleasant conversation at the table is, therefore, to be recommended.

ABSORPTION OF FOODS.

Food absorption takes place chiefly in the small intestine; in the stomach and in the large intestine it takes place only to a limited degree. In determining the degree of absorbability of food, the amount of the elementary food principles ingested must first be ascertained, and the proportion that has not been absorbed determined from the feces. The degree of absorbability of a food indicates, in a measure, its nutritive value. According to Atwater,[1] from an ordinary mixed meal an average of

[1] *Principles of Nutrition and Nutritive Value of Food*, Farmers' Bulletin No. 142, United States Department of Agriculture.

92 per cent. of protein, 95 per cent. of fats, and 97 per cent. of carbohydrates is absorbed in the body. "The proportion of the several nutrients which the body retains for its use are commonly called percentages or coefficients of digestibility." The following table, taken from Atwater, gives these coefficients of digestibility:

Coefficients of Digestibility and Fuel-value per Pound of Nutrients in Different Groups of Food-materials.

Kind of food.	Protein.		Fat.		Carbohydrates.	
	Digestibility.	Fuel-value per pound.	Digestibility.	Fuel-value per pound.	Digestibility.	Fuel-value per pound.
	Per ct.	*Calories.*	*Per ct.*	*Calories.*	*Per ct.*	*Calories.*
Meats and fish	97	1940	95	4040	98	1730
Eggs	97	1980	95	4090	98	1730
Dairy products	97	1940	95	3990	98	1730
Animal food (of mixed diet)	97	1940	95	4050	98	1730
Cereals	85	1750	90	3800	98	1860
Legumes (dried)	78	1570	90	3800	97	1840
Sugars	..	...	..	...	98	1750
Starches	..	...	..	...	98	1860
Vegetables	83	1410	90	3800	95	1800
Fruits	85	1520	90	3890	90	1630
Vegetable foods (of mixed diet)	84	1840	90	3800	97	1820
Total food (of mixed diet)	92	1820	95	4050	97	1820

Absorption of Protein.—Eighty per cent. of proteins are absorbed in the small intestine, and 14 per cent. in the large intestine. The proteins of animal food are much more completely absorbed than are those of vegetable origin.

Absorption of Fats.—Fats, like proteins, are absorbed mainly in the small intestine. This absorption of fat is very complete.

Absorption of Carbohydrates.—Carbohydrates are absorbed more completely than either the fats or the pro-

teins; consequently, these foods leave but a small residue in the intestine.

As Rubner, Atwater, and others have pointed out, foods taken in combination are absorbed more completely than when taken alone. Atwater has shown that the following proportions of the alimentary principles are absorbed when the individual takes a mixed diet:

	Protein.	Fat.	Carbohydrates.
Animal foods	98 per cent.	97 per cent.	100 per cent.
Cereals and sugars	85 "	96 "	98 "
Vegetables and fruits. . .	80 "	90 "	95 "

Food that leaves a small quantity of unabsorbed residue in the intestine is not undesirable, in that this residue stimulates peristalsis and thus regulates the condition of the bowels.

Absorption of Meat.—Meat leaves a very small residue in the intestines—about 3 per cent. of that ingested is not absorbed. On this account meat is a most valuable article of food.

Absorption of Fish.—Fish is very completely absorbed in the intestines. According to Langworthy, 95 per cent. of total solids, 97 per cent. of protein and 90 per cent. of fat are absorbed.

Absorption of Milk.—When milk is taken alone, only 90 per cent. of the constituents are absorbed; if two liters of milk are taken daily, the loss of dry substance, according to Rubner, is 5.7 to 7.8 per cent.; if three liters, the loss is 10.2 to 11.6 per cent. When taken with other foods, however, milk is much more completely absorbed.

Infants and children absorb milk much more completely than do adults. In childhood milk leaves a residue of 4 per per cent., whereas in adults 10 per cent. is not absorbed.

Absorption of Eggs.—Eggs are very thoroughly

absorbed in the intestine. Rubner states that hard-boiled eggs are absorbed almost as completely as meat, only 5 per cent. being lost.

Absorption of Vegetable Foods.—Vegetables are more or less completely absorbed in the intestine. If the bulk of the vegetables is not too great and the amount of cellulose is not too large, they will be almost entirely absorbed. On account of their bulk and the large proportions of cellulose which they contain, most vegetables are, however, incompletely absorbed. The protein is here the element that is not absorbed completely, the carbohydrates and fats undergoing complete absorption.

Absorption of Cereals.—Such cereals as rice are very completely absorbed; the starch is entirely absorbed, and 19 per cent. of the protein is lost.

Absorption of Legumes.—The legumes, such as peas and beans, if given in a finely divided state, are very completely absorbed. Rubner finds that even when given in amounts of 600 grams daily the loss is but slight. If, however, these substances are not given in a finely divided state, the loss in proteins is very great—according to Rubner, as high as 40 per cent.

Absorption of Roots and Tubers.—The absorption of roots and tubers, such as carrots, potatoes, etc., depends upon the quantity of cellulose they contain. Inasmuch as the potato contains but little cellulose, it is very completely absorbed.

Absorption of Green Vegetables.—Most green vegetables are very incompletely absorbed in the intestine. They leave a large residue, which acts as a stimulant to intestinal peristalsis.

Absorption of Fruits.—Fruits, like green vegetables, are usually incompletely absorbed; according to

Hutchinson, 80 per cent. of the protein, 90 per cent. of the fat, and 95 per cent. of the carbohydrates are ordinarily absorbed.

QUANTITY OF FOOD REQUIRED.

This varies necessarily under special conditions. The adult requires more food than does the child; a man at work more than one at rest; an emaciated individual less than when he was in robust condition. The selection of a proper diet is dependent upon a knowledge of the amount of the three alimentary substances—proteins, carbohydrates, and fats—necessary to maintain the nutritive equilibrium and consequently the body-weight.

Dietaries are formulated by computing the quantities of the alimentary principles required under special conditions.

Protein.—The quantity of protein disintegrated daily by a fasting healthy individual weighing 70 kilograms is 60 grams; it is obvious, therefore, that at least this amount should always be present in every computed dietary. Ordinarily from 100 to 125 grams of protein are consumed daily. As has been stated elsewhere, 1 gram of fat can replace 2.4 grams of protein or carbohydrates and the protein can replace and be partly replaced by the carbohydrates and fats. Fats and carbohydrates are, therefore, protein economizers. That part of the protein, however, required for organization of the body cannot be replaced by the carbohydrates or fats.

Low Protein Standards.—Chittenden and others believe that the best diet is that which contains the smallest amount needed to maintain life, together with fat and carbohydrates to cover the needed calories. They urge that health and weight may be maintained on this, and

that mental and physical efficiency is greater than when more food is taken. They believe that the protein is oxidized by the formation of substances more or less difficult of excretion, and that the presence and excretion of these products increase the wear and tear of the body without increasing its efficiency. There is no question that such diets may be taken and the individual still maintain health, and the experiments are of especial value in teaching us that in various diseases, such as gout, nephritis, and others in which it is desirable to reduce the protein to a minimum, that small amounts of protein are not incompatible with health and efficiency. There would seem to be certain objections to the continued use of a diet very low in protein, and it has been suggested that it renders the body less resistant to infection, and that it may also ultimately cause certain disturbances of metabolism. In certain cases the increased amounts of fat and carbohydrates necessary may mean undesirable bulk and strain on the digestive organs.

Protein Optimum.—The best amount of protein for an individual is still an open question. For a person of average size it is probably not well to go over 120 grams a day or under 60. This leaves a rather wide range, and it is safe to say that the optimum lies between the two. In certain diseases, as in tuberculosis, increases may be made above the maximum limit, and in certain diseases, as in nephritis and fevers, the amount may be reduced. In some diseases the kind of protein is a matter of considerable importance, and this is probably true of gout.

Purin Metabolism. (See also *Gout.*)—Certain forms of protein contain nitrogen in a form called the purin basis or purin bodies. These substances occur in such foods as liver and sweet bread, and is, to a somewhat less extent, in other meats, and they are also found in legumes

and in some other food. The products from these bodies are difficult of excretion, and in certain diseases it is a good thing to lessen the amount taken, particularly in nephritis and gout. The foods which contain the largest amounts are of the meats, liver, kidney, sweet breads, and beef tea and pigeon; of the fish, herring, sardines, sardellen, and anchovis; of vegetables, mushrooms and spinach, although there is less in these substances than in ordinary meat. Peas, beans, and lentils of various kinds also contain considerable amounts, while milk, cheese and eggs, most vegetables, fruit, cereals, and breadstuffs are free from purin nitrogen. There is a question about oatmeal, and it is generally ordered omitted from diets where the excretion of nitrogen is difficult.

Carbohydrates and Fats.—Carbohydrates diminish nitrogenous waste and are also sparers of the fats, 240 grams of carbohydrates being equal to 100 grams of fat. If 100 grams of protein are taken and absorbed with 600 grams of carbohydrates, the amount of fat can be completely protected. Fat alone, however, cannot check the waste of the nitrogenous tissues. The ingestion of large quantities of fat increases the accumulation of fat in the body, and this continues until the quantity administered reaches 300 grams, when no more can be digested. Gelatin is a valuable protector of protein, 100 grams of gelatin being equivalent to about 35 grams of protein or 200 grams of carbohydrates; it does not, however, protect against fat loss so well as do carbohydrates or fat, 100 grams of gelatin being equivalent to about 25 grams of fat. Ordinarily about 500 grams of carbohydrates and 50 grams of fat are consumed daily.

Protein, Carbohydrates, and Fats in Combination.—If fat is combined with the protein, less than half

the quantity of protein is required to maintain the nitrogenous equilibrium. If more protein, fat, or carbohydrate be supplied under these conditions, fat will be deposited in the tissues. Inasmuch as food contains a variable proportion of proteins, carbohydrates, and fats combined, the food-value must be determined from the standpoint of the combined effect of the three alimentary principles contained therein.

In order to supply the requirements of the organism a certain amount of potential energy is needed to overbalance the amount dissipated in waste and in the production of body-heat. More potential energy is consumed during work than when the individual is at rest. The following table, computed by Rubner, shows the daily heat consumption, in units of heat (calories), in an adult, weighing 65 kilograms:

During rest in bed	1800	calories	or	28	calories	per	kilo.
In repose	2100	"	"	32	"	"	"
In light work	2300	"	"	33	"	"	"
In moderate work	2600	"	"	40	"	"	"
In hard work	3100	"	"	48	"	"	"

From Rubner's investigations we learn that[1]—

1 gm. of protein	= 4.1	calories.
1 gm. of fat	= 9.3	"
1 gm. of carbohydrates	= 4.1	"

It has also been determined that 1 gram of alcohol equals 7 calories. In other words, the number of grams of proteins, fats, and carbohydrates required daily can be converted into their calorimetric equivalents, and inasmuch as we have already seen that the alimentary principles can in a degree be substituted for one another (law of isodynamics), the daily food requirements can be easily

[1] Compare Atwater's determinations on p. 14. Dietary computations differ slightly, owing to the fact that some use Rubner's standards and some Atwater's.

estimated in calories of heat. Thus, in order to calculate the caloric value of any food in preparing a dietary, the number of grams of proteins contained are multiplied by 4.1; the number of grams of fat by 9.3; and the number of grams of carbohydrates by 4.1; the total is then ascertained by adding. Bearing the weight of the individual in mind, a dietary can easily be constructed according to the following method:

The quantity of protein consumed daily is	100 gm.	$\times$	4.1	=	410
" " carbohydrates " "	500 "	$\times$	4.1	=	2050
" " fats " "	50 "	$\times$	9.3	=	465
					2925

The average number of calories required daily in an individual, according to this calculation, is therefore 3000.

While diet-lists are easily prepared according to the method just outlined, it must always be remembered that the digestibility and absorbability of food play a most important rôle and are not to be neglected in formulating the dietary; for while a certain food may contain a great many more calories than an equal weight of another food, yet its relative indigestibility makes it less available as an article of diet. For example, while 4 ounces of sausage produce 510 heat calories, 4 ounces of cheese 520, and 4 ounces of beef only 280, yet the beef is far more digestible than either the sausage or cheese, and thus more valuable as an article of food. As has been aptly said, "We live not upon what we eat, but upon what we digest." Therefore, a diet-list giving quantities of food principles or calories is useful only as it suggests general principles that may be modified to meet individual conditions in health and in disease.

The following is a very instructive table, compiled by Cautley in Sunderland's *System of Diet and Dietetics:*

The Caloric Value of Common Foods per Ounce.

(Meat, fish, and cereals are cooked. Vegetables are boiled.)

0–5.	5–10.	10–20.	20–30.	30–40.	40–50.	50–60.	60–70.	70–80.	80–90.	90–100.	100–125.	Over 125.
Vegetable marrow. Spinach. Seakale. Onion. Turnip. Savoy cabbage. Cauliflower. Parsnip. Beetroot. Carrot. Scarlet-runner (uncooked). Celery. Cucumber. Lettuce. Tomato. Radish. Buttermilk.	Asparagus. Broccoli. Artichoke. Broad beans. Green peas. Brussel sprouts. Water-melon. Whey.	Leeks. Salsify. Green artichoke. Petit pois. Haricot beans. Beetroot (uncooked). Strawberry. Pineapple. Lemon. Cranberry. Orange. Raspberry. Blackberry. Apricot. Apple. Pear. Nectarine. Benger's food (cooked). Most farinaceous foods. Koumiss Egg-white. Hake.	Potatoes. Cherries. Prunes. Figs. Grapes. Bananas. Crab (tinned). Lobster (tinned). Smelts. Dory. Sole. Whiting. Plaice. Turbot. Cod. Lemon sole. Tea. Jam. Milk.	Baked beans. Lentils. Macaroni. Scotch oatmeal. Haddock. Gurnet. Trout. Roach. Red mullet. Halibut. Jam.	Dried peas. Whole egg. Mackerel. Brill. Lobster (potted). Crab (potted).	Sprats. Salmon. Herring. Tunny. Chicken (fricasseed). Coffee.	Breads: Daren. Manhu. Cytos. Hovis. Brown. Salt herrings. Eels. Roast lamb. Roast beef. Veal cutlets. Roast veal.	Arrow-root. Breads (white). Bermaline. Graham. Pork sausage. German sausage. Toffee.	Sardines. Roast turkey. Mutton (legs, roasted or boiled). Ham. Cheese (Dutch). Camembert. Chestnuts. Treacle.	Roast pork. Brie cheese. Parmesan cheese. Currants (dried). Figs (dried). Filberts. Maple sugar.	Egg yolk. Polony. Roast mutton. Uncooked cereals. Milk. Cream cheese. Gorgonzola cheese. Cheddar cheese. Gruyére cheese. Cheshire cheese. Gloucester cheese. American cheese. Roquefort cheese. Raisins. Dates. Walnuts. Cocoanut. Cane-sugar. Beet-sugar. Honey.	Bacon (ribs). Stilton cheese. Neuchatel cheese. Peanuts. Sweet almonds. Cocoas. Chocolate. Butter.

The following table, taken from Mrs. E. H. Richards, gives an ideal ration of solid food. For a further consideration for the method of computing dietaries the reader is referred to Mrs. Richards' admirable little work, entitled *The Dietary Computer:*

An Ideal Ration of Solid Food.—(Mrs. E. H. Richards.)

Material.	Amounts.		Protein.		Fat.		Carbohydrates.		Calories.
	Gm.	*Oz.*	*Gm.*	*Oz.*	*Gm.*	*Oz.*	*Gm.*	*Oz.*	
Bread	453.6	16	31.75	1.12	2.26	0.08	257.28	4.04	1206.82
Meat	226.8	8	34 02	1.20	11.34	0.40	...	..	243.72
Oysters	226.8	8	12.42	0.44	2.04	0.07	...	..	70.01
Breakfast cocoa	28.3	1	6.60	0.23	7.50	0.26	9.60	0.34	135.42
Milk	113.4	4	3.63	0.13	4.42	0.16	4.88	0.17	75.55
Broth	453.6	16	18.14	0.64	18.14	0.64	90.72	3.20	613.21
Sugar	28.3	1	..	..	..	..	27.36	0.96	112.17
Butter	14.17	½	0.14	..	12.27	..	...	..	118.62
Total	...	..	106.80	..	57.97	..	389.80	..	2574.60

Nutritive Ratio.—In order to give some idea of the value in nitrogen or protein to the other constituents of the food, what is called the nutritive ratio is often stated in speaking of diet or foods.

This may be expressed as

$$\text{Protein} : \text{Carbohydrate} + 2\tfrac{1}{4}\ \text{Fat} :: 1 : x$$

Or,

$$\frac{\text{Carbohydrate} + 2\tfrac{1}{2}\ \text{Fat}}{\text{Protein.}}$$

In other words, it expresses the ratio between the amount of digestible protein and the amount of digestible carbohydrates plus the digestible fats. The fats are expressed in terms of carbohydrates, and 1 gram of fat is considered equal to 2¼ grams of carbohydrate. For example, in Voit's standard dietary, there is

Protein	118 grams.
Fats	56 "
Carbohydrates	500 "

The digestible part may be obtained by using the coefficients of digestibility, and we find these amounts:

Digestible protein	116 × 0.92 = 108.56
Digestible fat	56 × 0.95 = 53.20
Digestible carbohydrates	500 × 0.97 = 485

The fat in terms of carbohydrates is 52.20 × 2.25 = 119.7.

The total fat and carbohydrate in terms of carbohydrates is 485 + 119.7 = 604.7.

The nutritive ratio is 108.56 : 604.7 or 1 : 5.5.

Under ordinary conditions the ratio should not vary below 5 nor above 7. Of late the tendency is to widen the ratio, that is, to increase the carbohydrate factor.

The following table was prepared by the nurses in the class in dietetics at the Johns Hopkins Training School. It shows the method used in determining the fuel-value of the food per capita:

Table Showing the Method of Computing the Full Value of Foods in a Given Diet List.

Materials.	Weight, grams.	Protein grams.	Fat grams.	Carbo-hydrate grams.	Protein calories.	Fat calories.	Carbo-hydrate calories.	Total calories.
Oranges	31,837 (150 oranges)	186	31.0	2,646	765	289	10,848	11,904
Wheatena	2,547 (5 lbs. 10 oz.)	282	43.0	1,922	1,159	402	7,884	9,445
Eggs in shell	9,966 (175 eggs)	1,309	948.0	....	5,367	8,818	....	14,185
Bouillon	43,468 (24 quarts)	956	43.0	86	3,920	404	356	4,681
Chickens, roasting	33,960 (75 lbs.)	6,554	5535.0	....	26,872	57,480	....	78,352
Butter	679	6	577.0	....	27	5,369	....	5,396
Gravy:								
Butter	453	4	384.0	....	18	3,579	....	3,597
Flour	283	30	3.0	212	125	28	869	1,023
Potatoes, mashed	19,026 (¾ bushel)	344	18.0	2,801	1,412	175	11,485	13,073
Milk	2,718	90	108.0	136	369	1,009	558	1,937
Butter	679	678	577.0	....	27	5,369	....	5,396
Beans, dried lima	3,171 (7 quarts)	573	47.0	2,089	2,353	442	8,567	11,363
Butter	453	4	384.0	....	18	3,579	....	3,597
Radishes	4,530	41	4.0	181	168	41	778	988
Fruit jelly:								
Gelatine	268	226	0.2	....	927	2	....	930
Sugar	2,716	....	....	2,716	....	....	11,138	11,138
Lemons	1,358 (3 doz.)	13	9.0	115	55	88	473	616
Oranges	4,983 (2 doz.)	29	4.0	424	121	40	1,730	1,893
Bananas	2,716 (2 doz.)	21	10.0	380	89	100	1,559	1,749
Strawberries	905 (2 lbs.)	8	5.0	63	34	50	259	343
Custard:								
Milk	6,339	209	253.0	316	857	2,357	1,299	4,515
Eggs	1,132	144	109.0	....	589	1,010	....	1,599
Sugar	905	....	....	905	....	....	3,712	3,712
Sponge cake:								
Sugar	2,264	....	....	2,264	....	....	9,282	9,282
Eggs	3,396	432	327.0	....	1,767	3,030	....	4,797
Flour	2,264	245	25.0	1,696	1,004	232	6,955	8,193
Beef, rib roast, cold	9,060 (20 lbs.)	1,539	2408.0	....	3,812	22,402	....	26,214
Egg salad:								
Eggs	9,966 (175 eggs)	1,309	948.0	....	5,267	8,818	....	14,185
Lettuce	2,264	22	4.0	56	92	42	229	363

Boiled dressing:								
Eggs	849	125	89.0	....	515	829	....	1,344
Milk	1,811	59	72.0	90	245	673	371	1,290
Sugar	113	....	....	113	....	....	464	464
Butter	226	2	192.0	....	9	1,789	....	1,798
Strawberries	19,017 (42 lbs.)	171	114.0	1,331	701	1,061	5,458	7,220
Macaroons	2,356	153	358.0	1,536	628	3,332	6,300	10,259
Butter	8,154 (18 lbs.)	81	6937.0	....	332	64,532	....	64,864
Sugar	9,702	....	....	9,702	....	....	39,781	39,781
Bread	19,932 (50 loaves)	1,857	238.0	10,516	7,613	2,210	43,116	52,939
Cocoa	634 (1 lb. 6 oz.)	137	183.0	239	563	1,706	982	3,250
Milk	45,280 (12½ gallons)	1,494	1811.0	2,264	6,126	16,834	9,282	32,252
Rolls	13,590 (20 doz. rolls)	1,209	557.0	7,705	4,958	5,181	31,592	41,733
Totals	....	....	....	....	79,004	223,302	215,121	517,427

Summary of the Different Nutritive Constituents per Capita.

Proteid grams.	Fat grams.	Carbo-hydrate grams.	Protein calories.	Fat calories.	Carbo-hydrate calories.	Total calories per capita.
128	160	350	525	1,488	1,435	3,449

Nutritive ratio (ratio of proteins to fats and carbohydrates), 1 : 5.5. Fuel-value per person, 3449 calories.

Standard Amounts of the Different Nutritive Constituents Required Daily, According to the Following Authorities.

	Protein grams.	Fat grams.	Carbo-hydrate grams.	Protein calories.	Fat calories.	Carbo-hydrate calories.	Total calories.
Atwater	125	125	450	512.5	1162.5	1845	3520.0
Hutchison	125	50	500	512.5	465.0	2050	3027.5
Mrs. Richards Maximum	125	125	450	512.5	1162.5	1845	3520 0
Mrs. Richards Minimum	110	90	420	451.0	837.0	1722	3000.0

Standard nutritive ratio: Atwater, 1 : 5.5; Hutchison, 1 : 5.3.

Authorities referred to for food composition: *The Chemical Composition of American Food Materials*, W. O. Atwater; *Dietary Computer*, Ellen H. Richards.

The above results were obtained by the students of the Class in Dietetics. The menu was the one used in the Nurses' Home, May 1, 1904.

CHAPTER II.

CLASSES OF FOODS.

ANIMAL FOODS.

ANIMAL foods contain much digestible matter, chiefly proteins, a considerable quantity of fat, in some foods carbohydrates, and, in addition, water and mineral salts. Being thoroughly digested, they leave but little residue in the intestine. The various forms of animal foods—milk, meat, fish, and gelatin—will now be described.

MILK AND MILK PRODUCTION.

Milk, the most important of animal foods, contains all the elements necessary for the maintenance of life, and constitutes a complete food.

Composition.—Milk contains varying proportions of each of the four classes of food principles, protein, fats, carbohydrates, and mineral salts, and 84 to 90 per cent. of water, this latter varying with the quality of the milk. In a general way this is true of all milks, which are more or less alike, but which contain different percentages of the constituents.

Milk forms the exclusive diet for young, growing mammals, but owing to the fact that the proportions of protein and fat are in excess of the carbohydrates, it is unsuited as an exclusive diet for adults. Unless otherwise stated, cows' milk is meant by milk in this volume. Cows' milk is most extensively used for food, but the milk of goats, asses, and some other animals is used to some extent. Fresh cows' milk has a sweetish taste, a

characteristic odor, and is yellowish white in color. On standing it separates in two distinct layers, the upper being more yellow in color, of lighter specific gravity, and containing more fat. For dietetic purposes it is well to think of cream as milk containing varying proportions of fat. The lower part, called skim milk after the removal of the cream, is of a bluish-white color, and may be considered relatively free from fat.

The specific gravity of milk varies from 1.027 to 1.035, and it freezes at a slightly lower temperature than water. Freshly drawn, the milk of most carnivora is acid to the litmus reaction, human milk is usually alkaline, though not always, and cows' milk usually neither one nor the other, but becoming acid soon after milking.

The principal nitrogenous compound of milk is casein, which differs from the other protein compounds in that it contains both phosphorous and sulphur. Milk also contains other proteins, as lactalbumin, which is similar to the serum albumin of the blood. The total proteins averages about 3.3 per cent. of the bulk of the milk, or about 25 per cent. of the total solids. The fats of milk consist of the glycerids of palmitic, stearic, and oleic acids. The fat is suspended in the milk in the form of minute globules, which give the milk its white color and opacity. The fat globules in some milks are larger than in others, and they are smallest from a herd of mixed common cows and largest in the milk of Jerseys and Guernseys. Fat averages about 4 per cent. of the milk, or about 31 per cent. of the total solids.

The chief carbohydrate of milk is lactose, or milk-sugar, which is not nearly so sweet as ordinary sugar, and is less soluble in water. In the presence of the lactic acid bacillus it is converted into lactic acid, which causes the milk

to turn sour. Lactose forms about 38 per cent. of the total solids.

Milk contains about 0.7 per cent. of salts, which exist chiefly in the form of phosphates, chlorides, and sulphates. Calcium salts, which are found in the milk, are very essential to young, growing animals, inasmuch as they play a very important part in the formation of bone.

Variations in Milk.—There are wide variations in the composition of the milk of different animals. While human milk contains more sugar and less protein than cows' milk, the full value is about the same. Dogs' milk seems to be the richest, while that which comes from the horse is exceedingly poor, as may be seen from the following table:

Comparative Composition of Various Kinds of Milk.[1]

Kind of milk.	Water.	Total solids.	Total solids.						Fuel-value per pound.
			Protein.			Fat.	Carbohydrates (milk-sugar).	Mineral matters (ash).	
			Casein.	Albumin.	Total protein.				
	Per ct.	*Per ct.*	*Pr ct.*	*Pr ct.*	*Pr ct.*	*Pr ct.*	*Per ct.*	*Per ct.*	*Calories.*
Woman	87.4	12.6	1.0	1.3	2.3	3.8	6.2	0.3	319
Cow	87.2	12.8	3.0	0.5	3.5	3.7	4.9	0.7	313
Dog	75.4	24.6	6.1	5.1	11.2	9.6	3.1	0.7	671
Ewe	80.8	19.2	5.0	1.5	6.5	6.9	4.9	0.9	503
Buffalo	81.4	18.6	5.8	0.3	6.1	7.5	4.1	0.9	506
Cat	82.1	17.9	3.1	6.0	9.1	3.3	4.9	0.6	400
Goat	85.7	14.3	3.2	1.1	4.3	4.8	4.4	0.8	365
Llama	86.5	13.5	3.0	0.9	3.9	3.2	5.6	0.8	312
Ass	89.6	10.4	0.7	1.6	2.3	1.6	6.0	0.5	222
Mare	91.5	8.5	1.2	0.1	1.3	1.2	5.7	0.3	180

Not only is there a wide variation in the milk of different animals, but cows' milk itself is subject to great changes in the percentage composition of its ingredients. These may be attributed to many causes, the breed and

[1] König, *Chemie der menschlichen Nährungs- und Genussmittel*, 3d ed., vol. i., pp. 267–362.

conditions of the animals, and the food and care they receive being responsible, in a great degree, for these changes. As a rule, a young cow gives better milk than an old one, and a well-fed animal yields richer milk than one that is poorly fed. The milk flow is greater shortly after calving, but the milk increases in richness as the quantity becomes smaller. Milk also contains certain ferments, and there may be specific ferments which explains the desirability of milk of a particular species as food for animals belonging to it.

Action of Heat.—The amount of change taking place in milk on heating depends upon the degree of heat and length of exposure. Heating up to 60° C. does not appreciably change the appearance or taste, although some changes, which defy detection, evidently occur. When milk reaches a little over 60° C., a skum, composed largely of fatty matter and casein, forms on the surface. Acid milks are coagulated more easily and more quickly than milk which is not acid. Boiling milk changes its taste and color, the cream will not rise as quickly, if at all, and it is less easily coagulated by the action of rennet, and less easily pancreatized. The change in color is due to the production of a certain amount of caramel from the milk-sugar. Some of the more complicated compounds are broken up and some of the salts are precipitated.

Sterilization and Pasteurization.—Heat is employed very frequently in keeping milk, and there are two methods in vogue, spoken of as sterilization and pasteurization.

Sterilization of milk is accomplished either by boiling, preferably in the vessel in which it is to be kept, or by placing the bottles in one of the numerous forms of

sterilizers that are on the market. The essential part of the process is that the milk is heated to 212° F., and maintained at that temperature, or for ten minutes or longer, sufficient to kill off the living bacteria which the milk contains. It is to be noted, however, that the spores and spore-bearing bacteria are not killed by this temperature, and that if the milk is kept under suitable conditions for bacterial growth, bacteria will develop from the spores and the milk may spoil in consequence.

FIG. 1.—Arnold sterilizer.

In order to secure perfectly sterile milk it is, therefore, necessary to repeat the sterilization three times on three successive days. In practical work this is rarely done, except in the production of culture-media for bacterial researches or in preparing milk for long voyages. Ordinarily, milk heated once and then kept cold, 40° or under, will keep perfectly well till the length of time required in its ordinary consumption. There are certain objections to sterilized milk. Certain changes are produced in the milk which have been detailed under the heading of the "Effects of Heat." Sterilizing also kills all the ferments, and places the milk in the class of lifeless foods. Sterilizing on a large scale has never become popular in America, perhaps on account of the change in taste and the added expense. It may be used with advantage, however, in keeping milk in very hot weather, especially when the ice supply is deficient.

By pasteurization is meant the process by which the

milk is rendered more or less sterile by heating to 167° F., and in some instances to a lower temperature, maintaining this degree of heat for from twenty to forty-five minutes, and then cooling the milk rapidly to 40° or 45°, or lower. This degree of temperature is sufficient to kill off most of the bacteria, and especially the pathogenic bacteria, but it does not render the milk absolutely sterile, so that it does not keep as well as that which has been heated to a higher temperature. It has the advantage, however, of not changing materially the composition of the milk. Pasteurized milk should be kept cold or it will spoil nearly as rapidly as unheated milk. It is useful in summer, and in keeping milk which is to be fed to babies, and is being used at the present time very extensively for keeping commercial milk. In the household, for the purpose of infant feeding, pasteurization is done in two ways. Best, by using one of the special forms of pasteurizers, such as Freeman's, which consists of two parts, a pail for the water and receptacle for the bottles of milk. The pail is a simple pail with a cover; there is a groove extending around the pail to indicate the level to which it is to be filled with water, and supports inside for the receptacle for the bottles of milk to rest on. The receptacle for the bottles of milk consists of a series of hollow zinc cylinders fastened together; this fits into the pail, so that the lower end of the cylinders is immersed in the water. This receptacle has two sets of horizontal supports, the upper set continuous around the receptacle, for use while the milk is being heated; the lower interrupted set is used for raising the receptacle during cooling. Such receptacles are made for ten 6-ounce bottles, seven 8-ounce bottles, three 1-pint and one ½-pint bottles, and two 1-quart bottles.

There is also a large apparatus for the use of hospitals or public institutions, which has a receptacle for forty-three 6-ounce or 8-ounce bottles.

The apparatus is used in the following way: The pail is filled to the level of the groove with water, covered, and put on the stove, the receptacle for the bottles being left out. The bottles of milk are then filled, stoppered with cotton, and dropped into their places in the cylinders. Sufficient water is poured into each cylinder to surround

FIG. 2.—Freeman's Pasteurizer.

the body of the bottle. As soon as the water in the pail boils thoroughly it is taken from the stove and set on a mat or table, or other non-conductor, in a place where there is not a draft of wind blowing on it. The lid of the pail is removed and the receptacle placed on the upper continuous supports. The lid is then rapidly put on the pail, and the pail is thus allowed to stand for three-quarters of an hour. During the first fifteen minutes the temperature of the milk rises to about its maximum, or above 65° C., the point desired for pasteurizing, and remains there the remaining thirty minutes. During the last fifteen minutes the cover of the pail is removed, the receptacle is lifted and given a turn so as to rest on the lower supports, thus bringing the top of the

cylinders containing the bottles above the level of the pail. The pail is then put under a cold-water faucet, and the water is allowed to run into the pail and overflow, but it should not run into the cylinders. Thus the hot water is replaced by cold water, and in fifteen minutes the milk in the bottles is of about the temperature of the cold water used. The bottles may then be put into a refrigerator until required for feeding. This rapid cooling is a most important part of a low-temperature sterilization, the importance of which is apt to be overlooked.

When there is no special apparatus at hand, reasonably good results may be obtained by placing the milk bottles in a pail, filling the pail to the height of the milk in the bottles, and bringing just to a boil, then setting to one side for thirty minutes. In commercial pasteurization special forms of apparatus are used, in which large quantities of milk may be heated to the required temperature for twenty minutes.

The advantages of pasteurization are that it is a cheap and effective method of preventing the ordinary infectious diseases, which may at times be spread by milk, and doubtless lessens the number of cases of infantile diarrhea. It should be remembered that pasteurization cannot make bad milk good or dirty milk clean, and when used for infants or invalids it must be modified in the same manner as unheated milk.

The disadvantages of pasteurized milk are that it is usually done a long way from the place of production, the milk may be spoiled before it is pasteurized, and while the bacteria are for the most part killed, the toxins, which may have been formed, are not destroyed, and so dangerous milk may be sold for good milk. This is, however, counterbalanced by the real lessening of infantile diarrhea.

Another disadvantage is that the milk producer is apt to become careless and trust to pasteurization to kill off the bacteria, instead of using cold and cleanliness. Pasteurized milk is popularly supposed to be less digestible than unheated milk, especially for infants. The difference in digestibility of pasteurized and unheated milk is certainly slight, but the best results in infant feeding are obtained with unheated milk. We are of the decided opinion that unheated milk is far superior in the long run where it can be obtained of sufficient purity to permit of its use. There are other objections sometimes urged, such as it favors the development of scurvy. This is evidently true, but is a lesser evil than diarrhea.

For infant feeding, unheated milk, when good milk can be obtained and can be kept cold, is best of all. If the weather is warm and the milk not above suspicion, it should be pasteurized. The average city milk in summer should be pasteurized. Sterilizing may be resorted to where the milk supply is very poor and where the ice supply is deficient, and where it has been found that the milk will not keep without it.

Sterilizing milk under pressure is rarely resorted to outside of laboratories. A temperature of 220° F. for thirty minutes is ordinarily considered to produce sterile milk, but sometimes even this is insufficient.

Digestion of Milk.—When milk enters the stomach it is coagulated by the hydrochloric acid and the rennin of the gastric juice. These curds, or coagula, consist of precipitated casein and a portion of the fat that has become entangled in the curd. They vary in size and consistence according to the amount and the dilution of the milk taken. The casein soon undergoes a change, being converted into some form of peptone, and the fat is again

liberated. The albuminous envelope of the fat-globules is dissolved and the fat coalesces, forming larger drops, in which condition it passes into the duodenum. A portion of the water and some of the salts are absorbed in the stomach. The curd that has not been acted upon by the gastric juice, together with the water, salts, and carbohydrates that still remain, also pass into the intestine, where their digestion is completed. Boiling increases the digestibility of milk, the precipitate being deposited in a more flocculent form. If the milk is previously diluted with lime-water, barley-water, or one of the aërated waters, such as Vichy, the curds formed are smaller and softer, and the milk often rendered more palatable. Bread and crackers added to milk make a good mechanical diluent by mingling with it and maintaining a soft condition of the curds. The addition of alkalis may be resorted to with a view to neutralizing the acids. This has the effect of coagulating the casein more slowly, and forming flocculi rather than cheesy masses.

Color of Milk.—Various changes in the color of milk are not uncommon, the best known of which is a blue milk due to the action of bacteria. Red milk may be due to the presence of blood due to injury of the udder or mammary gland, to the cows having fed on plants containing red pigments, such as the madder plant, and, more rarely, to the action of bacteria. Green, yellow, chocolate-colored, and black milk have been described, and are also due to the action of bacteria.

Slimy or Ropy Milk.—This is a very curious change which occasionally takes place in milk, and is due to the action of certain bacteria. The milk becomes slimy or ropy, and can be drawn out into long, thin threads, even as long as ten feet. In some countries, particularly Nor-

way, slimy milk is produced by the addition of certain leaves to the milk and the product used as food; the leaves contain the slime-producing bacteria. This change is also induced for the manufacture of certain cheeses, particularly Edam.

Bitter Milk.—This is very common, most frequently being caused by the cows having fed on plants containing bitter substances. It may also occur during the last stages of lactation, and sometimes by the presence of certain bacteria.

Alkaline Fermentation of Milk.—Milk which has been boiled does not sour through spontaneous fermentation, but if exposed to the air at ordinary temperature it becomes alkaline in reaction, sometimes develops a bitter taste, and then curdles. Later on the curd dissolves, and a more or less clear fluid is left. These changes are due to bacteria.

Flavors in Milk.—The flavor of milk may vary from time to time, and this may be due to the food, such things as wild onion, even in small quantities, affecting the flavor of the milk very markedly; and disorders in the cow may also cause unusual flavors for a few days. Milk also absorbs odors, and if kept in an ice-box with odoriferous substances it may take on their flavor. The growth of bacteria also alters the taste of milk very materially, and may impart many different flavors to it.

Bacteria in Milk.—Milk is a most excellent culture-media for bacteria, and most germs grow luxuriously in it at the expense of the quality of the milk. The changes produced are largely those of decomposition, many of them are exceedingly complex, resulting in the production of changes in the flavor, odor, color, and the quality of the milk. The proteins may become decomposed, the

sugar converted into gases, alcohol or acids, while the fats are but little changed. The number of bacteria in milk varies greatly, the very best milk containing but a few thousand bacteria per cubic centimeter, while very poor milk may contain many millions in the same quantity. In Rochester, and many other cities, 100,000 per cubic centimeter is regarded as the limit in milk fit for human food. Milk containing more than this should be regarded as unfit for human consumption, and especially for infants and young children. The nature of the bacteria present is important, as disease-producing germs are dangerous to the public health. As a rule, milk which contains but few bacteria will contain none of the disease-producing varieties, or but very few, while milk containing large numbers of bacteria is very liable to contain those which produce disease. Nearly all the disease-producing bacteria grow better at or near the body temperature, and grow slowly, if it at all, in milk which is cold enough to prevent the rapid growth of bacteria. To prevent bacteria in the milk from increasing it should be chilled to 45° or 40° F., and kept at that temperature until used.

Each time milk is handled, such as pouring from one vessel to another, there is an increase in the number of bacteria. The chief source of bacteria in the milk is from the dirt which gets in at the time of milking, and from the milk being placed in dirty utensils.

Souring of Milk.—With but few exceptions, milk will sour in various lengths of time, and it may be regarded as a normal phenomenon. As a matter of fact, milk which does not sour under ordinary conditions should be regarded with suspicion and tested for preservatives. When the milk reaches a certain stage of acidity it

curdles. Ordinarily the souring of milk is due to one or two varieties of bacteria, but there are many other bacteria which may occasionally cause it to turn. The most common cause of the souring is a germ called the lactic acid bacillus, which grows best when the milk is kept in deep vessels, where the air is more or less excluded. Milk soured by this bacillus has a firm clot with a little whey on top, and is free from gas. When the curd is broken up by shaking, it separates from the whey and sinks to the bottom. Such milk has a pleasant acid taste, and is much used for food, either as clabber or curds and whey or cottage cheese. The next most common acid-producing bacteria grows best when the milk is in shallow pans, and it produces gas, so that the curd is broken up and contains gas-bubbles. These bacteria are a source of trouble to manufacturers of cheese.

There is a peculiar belief that a thunder shower will sour milk, but it is probable that the conditions which produce thunder showers are those favorable to the growth of bacteria which sour milk, and during the hot weather milk frequently sours apart from thunder storms, and also that milk cooled immediately after milking and kept properly cooled will not sour during a thunder storm.

Milk Production.—The production of milk, which will keep a reasonable length of time and be free from objectionable features, is a comparatively simple matter, but it requires care and constant supervision and is best undertaken by persons trained in dairying. The first consideration is the cow herself, and to produce good, pure milk the cow must be healthy and must be kept clean. Sick cattle should be separated from the herd, and if a herd is to be kept free from tuberculosis, no cow should be added to it without first having been tested by tuber-

culin, and the entire herd should be tested from time to time. The cow should be groomed regularly, the same as a horse, the oftener the better, and this reduces the bacterial contamination of milk very materially. Some dairymen cut off the longer hairs about the flanks and tail to lessen the danger of having them soiled with feces. The grooming should be done before milking, and the cow should not be allowed to lie down until she has been milked. The stables should be clean, light, and airy, and a special milking-room is desirable, unless the barn is of good construction and of sufficient size. Anything which stirs up dust should be avoided. The barnyard should be kept clean and drained. The employees should be healthy and clean, and the hands should be thoroughly scrubbed before milking. Many large dairy farms supply sterile suits to their employees to be worn at milking time. No one who has, or who has recently had, or who is associated in any way with any contagious disease, should be allowed to have anything whatever to do with the milk production.

The milk pails and all milk receptacles should be kept clean, and scalded as thoroughly as possible, and sterilizing with live steam should be done wherever practicable. The water supply of the dairy is of great importance, and many large dairy companies now insist upon special examination of the water and water-supply before receiving milk from farms.

Specially constructed milk pails, which, in a large measure prevent the dirt and dust from falling into the milk, are sometimes used, and assist in reducing the contamination of the milk.

The Transportation and Delivery of Milk.—This cannot be fully considered here, but it may be

stated that the milk should be transported in sterile cans or bottles; that the pouring of milk from one can to another, or to bottles, should only be allowed in a room provided especially for that purpose, free from dust and other source of contamination. The milk should be kept cold the entire time until it reaches the consumer, and by him until used. The selling of milk from open cans in grocery and provision shops should be prohibited. The safest method of marketing milk is in sealed bottles, and, unless some other solution of the problem offers, this should be the only way. Selling from cans, the way it is done in the United States, is open to a number of objections, but the public has not been educated to demand pure bottled milk, although much has been done in this direction.

Adulteration of Milk.—The most frequent adulteration of milk consists in the removal of part of the cream and adding water. In other instances, good milk and skim milk are mixed together; in both instances the consumer is robbed by paying for an article of food which does not have the nutritive value it is commonly supposed to possess. The addition of water brings the added danger of contaminating the milk, as a milk dealer, sufficiently unscrupulous to add water to his milk, would be apt to disregard the character of water used, and, as a matter of fact, a number of typhoid epidemics have been caused in this way. Milk is artificially colored, but this practice is not common, as is popularly supposed. Almost all communities have laws forbidding the adulteration of milk in any way.

The Use of Preservatives.—Chemical preservatives are frequently added to the milk to prevent the growth of bacteria, and it is done after the milk has

partly spoiled. The most frequently used articles are: formaldehyd, boric acid, borax, salicylic acid, and benzoic acid. But small amounts are needed to check the growth of bacteria, but the unscrupulous dealer usually adds a great deal more than is necessary. Milk which does not sour within a reasonable length of time, under favorable conditions for souring, should be tested for preservatives. The use of all such preservatives should be prohibited by law.

Examination of Milk.—Testing the quality of milk requires a more or less expert knowledge of chemistry and of bacteriology. In testing milk the specific gravity is usually taken by means of a lactometer; the amount of fat present is estimated by use of a special apparatus known as the Babcock testing machine; the amount of protein present may also be estimated; the number and nature of the bacteria present is frequently gone into by bacteriologists, and the milk is tested for the presence of preservatives.

Cream.—When milk is allowed to stand undisturbed, the fat droplets, being of lower specific gravity than the remainder of the milk, gradually rise to the top, and the longer the milk stands up to a certain limit the more cream will be found. Creams are usually spoken of with reference to the amount of fat they contain, so one speaks of a 16 per cent. cream, 20 per cent. cream, etc. The cream which rises on average milk after twenty-four hours usually contains about 16 per cent. fat, and is spoken of as gravity cream. Some gravity cream may contain as much as 18 or 20 per cent. fat, while the richer creams are obtained by centrifugalizing the milk. The composition of the various percentages of creams are given in the following table from Holt:

Whole milk.	Cream.				
	I.	II.	III.	IV.	V.
Fat 4.00	8.00	12.00	16.00	20.00	40.00
Sugar 4.50	4.50	4.20	4.05	3.90	3.00
Protein . . . 3.50	3.40	3.30	3.20	3.05	2.20
Salts 0.75	0.70	0.65	0.60	0.55	0.45

The fat droplets in cream vary in size in the different varieties of cows. In the Alderneys and Guernseys the droplets are larger, less uniform in size, and more numerous than in milk from the ordinary milch cow. The small uniform fat droplets of milk from the average herds are to be preferred in infant feeding. Cream rises best on milk that has been cooled quickly after mixing, and that has been handled but little. Milk which has been shaken up frequently, and frozen and thawed, does not yield as much cream nor as quickly.

Skim Milk.—This is the residue remaining after the removal of cream from ordinary milk, and differs from it in having most of the fat removed, and in being slightly richer in casein and milk-sugar. It is easily digested by most people, and is frequently sold as whole milk.

Butter.—Butter is made from milk by churning, which causes the fat globules in the milk to coalesce, thus forming a solid mass. It is made most rapidly from cream that has been ripened from twelve to twenty-four hours, and churned at a temperature between 65° and 70° F. In this way butter may be separated in from twelve to thirty minutes. The process of ripening depends on the presence of certain bacteria, and in some creameries instead of depending on chance bacterial invasions of the milk, which may produce at times unpleasant flavors, it is the practice to inoculate the milk with a culture of bac-

teria known to impart a desirable flavor. On account of the ease with which fresh butter is digested it is one of the most valuable of the fatty foods.

When butter is kept too long it becomes rancid, and this is due chiefly to the fermentation of the small amount of casein remaining in the butter. To avoid this the butter should be kept cold. Salting is largely used for preventing this fermentation. The amount used should not exceed 2 per cent., but should be worked into the butter so that no undissolved particles remain. Butter is often colored, largely because the public still like a dark-yellow color. Anotto is largely used for this purpose. The United States standard for butter is that it should not contain more than 16 per cent. of water nor less than 82.5 per cent. of butter-fat.

Renovated butter is made from butter which has become rancid, by melting and then washing with water. It is afterward given a better flavor by mixing with a certain amount of sour cream.

Buttermilk.—The residue left in the churn is called buttermilk, and is largely used as a beverage, as it is nutritious and easily digested. It contains the casein of the milk in a finely coagulated form, has a pleasant acid taste, and contains lactic-acid bacilli. The buttermilk left after churning fresh milk has approximately the same composition as skim milk. Buttermilk from ripened cream varies somewhat in its composition.

A preparation similar to buttermilk is also frequently made from the whole milk by inoculating with lactic-acid bacilli. It has the advantage that it contains all of the fat. Such milk is much in vogue at the present time, and is used in feeding invalids, especially those with certain forms of gastric and intestinal disorders, and in the feed-

ing of infants. Conserved buttermilk, made somewhat after the manner of condensed milk, is also used, especially for infant feeding.

Bonnyclabber.—This is soured milk in which the curd and whey are served in the same dish and usually eaten with the addition of sugar. Curd and whey, or junket, is milk where the coagulation has been brought about by the action of rennet. In many instances the whey is removed and used as a food for invalids and infants.

Cheese.—Cheese is made of the curd and a certain proportion of the fat of milk, and varies in composition and consistence according to the method employed in the manufacture. The simplest form of cheese is the so-called cottage cheese, in which the curd is separated from the whey and eaten a short time after it is made. The other cheeses are kept a certain length of time to insure ripening. Sometimes the coagulation is produced by rennet and sometimes by lactic acid, while various forms of bacteria growing in the cheese and also certain moulds impart to the different varieties their peculiar flavors. Some cheeses are hard and some are soft, the difference being due to the amount of pressure used in hardening them. As a rule, the harder cheeses keep very much longer than the softer ones, and the harder the cheese the more indigestible it is. Like milk, cheese may contain certain poisonous substances, due to bacterial action, and severe poisoning may follow the eating of such cheese. The average composition of cheese, as shown by Parks, is as follows:

Water	36.0
Protein	31.0
Fats	28.5
Salts	4.5

Condensed Milk.—This is manufactured by heating the milk to 212° F. to sterilize it and then evaporating in a vacuum until it becomes thick and jelly-like. To this considerable amounts of cane-sugar are added. In some cities fresh condensed milk may be obtained which has not had sugar added to it. The composition of condensed milk is as follows:

	Total solids per cent.	Protein per cent.	Fat per cent.	Milk-sugar per cent.	Cane-sugar per cent.
Unsweetened condensed milk	40	12	12	16	0
Sweetened condensed milk	80	12	12	18	40

Condensed milk is largely used as a substitute for fresh milk by many people, is of especial value in the tropics and on voyages, as well as being a useful food under certain conditions for infants. It is easily digested, and the better brands are reasonably pure, but in the dilutions usually used it is too high in sugar percentage and too low in fat. It produces fat, pale, flabby babies, with a tendency to rickets and scurvy, and a lowered resistance to infections. On the other hand, it is most valuable in infants with feeble digestive powers, and those who are not gaining in weight, and in hot summer weather is to be recommended where the fresh milk is of questionable purity. (See Infant Feeding.) It should be remembered that condensed milk may be made from dirty milk, and so be objectionable, and that it may contain large numbers of bacteria. We have found Borden's Eagle Brand satisfactory. Among other brands the Anglo-Swiss and the Ideal may be mentioned.

Another method of conserving milk, known as the Campbell method, has been recently introduced, and the product is now obtainable in some places. Pure milk is placed in a concentrating vat and warmed to 140° F. A

blast of filtered air is driven through it for about three hours or until the original volume is reduced to one quarter. This is then bottled in sterile bottles. It may be used just as it is in coffee or tea, diluted one-half in place of cream, or with three times the amount of water in place of ordinary milk. The milk is marketed under the name of White Cross Milk.

Predigestion of Milk.—Milk may be partly or wholly predigested in order to render it more easily digestible for individuals suffering from gastro-intestinal disorders. This process is readily accomplished by adding an active preparation of pepsin to acidulated milk and allowing the fermentation to proceed under the influence of heat at the body temperature by immersion in hot water. During this fermentation the casein is partly or completely converted into albumoses. If the process is allowed to continue too long, the milk becomes bitter. For this reason it is ordinarily removed from the hot water after a few minutes, and is placed upon ice, which prevents further fermentation. In order to predigest milk in alkaline solution, pancreatin is substituted for pepsin; pancreatization of milk has now largely replaced peptonization. In order to effect pancreatization of milk Fairchild's peptonizing tubes are ordinarily employed. These tubes contain 5 grains of pancreatic extract and 15 grains of sodium bicarbonate. Each tube contains sufficient powder to digest one pint of milk. Another easy method of partially pancreatizing milk is by the use of Fairchild's peptogenic milk powder. First dissolve the powder in the water by rubbing and stirring with a spoon, then add the milk and cream; mix well; heat in a saucepan with constant stirring until blood-warm—not too hot to be agreeably borne by the mouth; keep at about this temperature for ten minutes; then bring quickly to boiling-point;

pour at once into a clean bottle, shake thoroughly, cork tightly, and place directly on ice or in a very cold place.

Where the taste of pancreatized milk proves objectionable, the addition of carbonated waters, or of small quantities of coffee, may render it more palatable.

The digestibility of milk may be increased by the addition of hot or cold water, or carbonated waters, such as Vichy or Apollinaris, lime-water, oatmeal, or barley-water, or farinaceous foods, such as arrow-root or flour; occasionally small quantities of salt or sodium bicarbonate are helpful.

Kumiss, Kefir, and Matzoon.—Kumiss is a fermented drink prepared by both lactic acid and alcoholic fermentation. For many centuries it has been made from mares' milk by the natives living near the shores of the Caspian Sea. The milk is obtained from a special breed of mares, the animals being fed very carefully. The milk is mixed with a kumiss ferment, the lactic acid ferment converting some of the sugar into lactic acid, while another part of the sugar is converted into alcohol and carbonic acid; a small quantity of casein is digested. The milk is constantly agitated, and the fermentation allowed to proceed for a period of twenty-four hours or more.

Kumiss is an acid, effervescing drink, and contains a very small proportion of alcohol. It is very easily digested, being much more digestible than milk. The casein is so finely divided that lumps cannot be formed in the stomach, and it is easily acted upon by the gastric secretion. In the United States it has been prepared from cows' milk, to which the ferment is added.

Kumiss Cure.—In certain parts of Russia this form of cure is not uncommon. It consists in drinking small quantities of kumiss, and gradually increasing them until

large quantities are taken. Kumiss cures have been prescribed in chronic gastro-intestinal catarrhs and chronic catarrhs of the respiratory tract.

Kefir resembles kumiss, and is often used as a substitute for it. It was originally made in the Caucasus from cows' milk, fermented with Saccharomyces mycoderma, lactic acid fermentation going on at the same time. Alcohol, lactic acid, and albumins are formed as a result of the fermentative processes. The casein is partly digested. Tablets of the kefir ferment have been prepared by Jurock, and are sold under the name of kefilac tablets. They render the home manufacture of kefir an easy matter. (See Recipes.)

Matzoon.—In this form of milk lactic acid is produced by fermentation with a ferment obtained from Syria. It is thicker than kumiss, and does not contain alcohol.

Kumiss, kefir, and matzoon are agreeable forms of milk foods, are easily digestible, and are especially useful in those cases in which milk cannot be taken or is not well borne.

EGGS.

Eggs, like milk, form a complete food—that is, they contain a proportion of each of the fundamental food elements necessary for the preservation of life. Eggs and milk are the only complete food products furnished by the animal kingdom.

The eggs of the hen are consumed in largest numbers, but those of the duck, turkey, guinea-hen, and of some wild fowl are also eaten. The eggs of the domestic fowls vary in size and appearance, but their composition is about the same.

The shell of a hen's egg constitutes 11 parts, the white 57 parts, and the yolk 32 parts of the entire weight of

the egg. The table on page 61 shows the composition of hens' eggs, cooked and raw.

As may be seen from that table, the egg contains mainly protein and fats, in addition to water and mineral matter. The white and the yolk differ in composition, the white containing more protein and water than the yolk, and scarcely any fat and ash; whereas the yolk contains considerable fat and ash. The white is said to be pure protein.

The flavor of the egg is dependent in a large measure upon the food eaten by the laying hen. Fresh eggs, as is well known, have the finest flavor.

If thoroughly macerated, hard-boiled eggs are as digestible as soft-boiled ones. With some persons eggs in any form are indigestible, and produce unpleasant eructations, nausea and headache.

Raw eggs are best taken directly from the shell, or they may be combined with milk broths or with coffee. In various diseases accompanied by loss of flesh and strength raw eggs in large numbers are prescribed, as many as 24 eggs being given in twenty-four hours.

Egg-albumin is best absorbed when eaten raw and properly diluted. Its palatability may be increased by flavoring it with sherry wine, orange-, lemon-, or grape-juice, or by serving it in cream, cocoa or coffee.

Egg-nog is prepared from milk and eggs, flavored with some alcoholic drink, and sweetened with sugar.

MEATS AND MEAT PREPARATIONS.

Meat forms the flesh or muscular parts of the body. It is one of the most important articles of food and is the chief source of man's protein supply. Meat may be eaten raw or cooked. Raw meat, when well ground up, is very easily digested.

Meat is composed of muscle-fibers held together by connective-tissue bands; between the muscle-fibers are bits of fat. As ordinarily seen meat contains muscle-tissue, connective tissues, blood-vessels, nerves, and lymphatics, together with a varying amount of fat. The more fat there is in meat the less water and nitrogenous matter does it contain, and *vice versa.* Cooking has the effect of rendering the connective tissues soluble, thereby causing a separation of the muscular fibers, allowing the digestive secretion to mingle more thoroughly with them. Cooking also enhances the flavor and appearance of the meat, but, on the other hand, causes a loss in fat and extractives. Cooking likewise destroys the micro-organisms that may be present in the meat and thus renders it more wholesome.

Digestibility of Meats.—The digestibility of meat is governed by many conditions: The age at which the animals eaten were killed, the length of time the meat is kept before eating, the care bestowed upon the animals during life, and the methods of preparing the meats for the table. Meats are most easily digested when stewed; frying renders them most indigestible.

Beef.—The composition of beef varies greatly, especially in regard to the amount of fat and water it contains. An ox from three to five years old supplies the best beef. The meat of a very lean animal will contain about 75 per cent. of water and about 2 per cent. of fat.

Meat Preparations.—Numerous meat preparations, both solids and liquid, are now on the market, the aim being to produce a concentrated food that will be readily digested. The different beef-juices have but slight nutritive value, most of them containing only 4 or 5 per cent. of protein; their chief value lies in the fact that they stimulate the appetite.

Bouillons.—Bouillons are prepared by cutting meat into small bits, heating slowly in water for a time, and then boiling it quickly. The fluid thus produced has a very agreeable flavor, but its nutrient value is exceedingly small.

Beef-extracts.—Beef-extracts are concentrated bouillons that are to be diluted at the time they are taken. Their nutritive value is about the same as that of bouillon.

Beef-juice.—To produce a nutritious liquid-beef preparation, the meat should be broiled slightly and then cut into small pieces and pressed through a lemon-squeezer or a meat-press. In this way considerable quantities of protein, in addition to the salts and extractives, are obtained. The beef-juices sold on the market, such as Valentine's, are prepared by subjecting the meat to a strong pressure. These preparations contain from 5 to 10 per cent. of protein.

Meat Powders.—The nutritive value of these preparations varies greatly. Those most frequently used are a number of pêptones, Somatose, and the Mosquera "Beef Meal."

Meat-jellies.—Meat-jellies are frequently given to invalids and are an agreeable means of administering protein food. Although they do not entirely replace the protein in the tissues, they produce a considerable quantity of energy.

Veal.—Veal is tough and indigestible, especially when obtained from the animals that are killed too young. It differs considerably in flavor from beef. As in many persons veal has a tendency to produce indigestion, it is to be avoided in all cases of digestive debility.

Mutton.—Mutton is considered more digestible than beef by English writers, probably because in England

the average mutton is more tender than that obtained in the United States; the beef, however, is inferior to that raised in this country.

Lamb.—Lamb, when of the right age and tenderness, is as digestible as beef or mutton.

Venison.—Unless obtained from young animals, when it is tender, highly-flavored and short-fibered, venison is apt to be difficult of digestion.

Pork.—Pork is the most indigestible of all meats, on account of the large percentage of fat that it contains.

Ham and Bacon.—Ham and bacon are both more digestible than pork. In some parts of Germany ham plays quite an important part in invalid dietaries. Bacon is used largely as an army ration. When cooked crisp, thin slices of bacon are easily digested.

Rabbit.—When young, rabbit meat is quite digestible, but it is usually omitted from diet-lists.

Fowl.—Chicken is one of the most digestible and agreeable varieties of meats. The meat of young pigeons also is especially digestible; that of ducks and geese contains too much fat.

The flesh of game is easily digested, the meat of the breast being best adapted for invalid use.

FISH.

The different kinds of fish vary widely in their nutritive and digestive qualities. For example, the flounder and the oyster are much easier of digestion than those that contain a large amount of fat, like the salmon and the herring. Eels contain the greatest proportion of fat, which may reach 28 per cent. White-fleshed fish, as a rule, contain little fat.

The table, compiled from Atwater and Langworthy, gives the chemical composition of some animal foods:

Composition of animal foods.	Refuse.	Water.	Protein.	Fat.	Carbo-hydrates.	Ash.	Fuel value per pound.
	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Calories.
Eggs hen.							
Whole egg as purchased	11.2	65.5	11.9	9.3	..	0.9	635
Whole egg, edible portion	..	73.7	13.4	10.5	..	1.0	720
White	..	86.2	12.3	0.2	..	0.6	250
Yolk	..	49.5	15.7	33.3	..	1.1	1705
Whole egg boiled, edible portion	..	73.3	13.2	12.0	..	0.8	765
White-shelled eggs as purchased	10.7	65.6	11.8	10.8	..	0.6	675
Brown-shelled eggs as purchased	10.9	64.8	11.9	11.2	..	0.7	695
Beef, fresh.							
Chuck ribs	16.3	52.6	15.5	15.0	..	0.8	910
Flank	10.2	54.0	17.0	19.0	..	0.7	1105
Porterhouse steak	12.7	52.4	19.1	17.9	..	0.8	1100
Sirloin steak	12.8	54.0	16.5	16.1	..	0.9	975
Ribs	20.8	43.8	13.9	21.2	..	0.7	1135
Round	7.2	60.7	19.0	12.8	..	1.0	890
Rump	20.7	45.0	13.8	20.2	..	0.7	1090
Shank, fore	36.9	42.9	12.8	7.3	..	0.6	545
Shoulder and clod	16.4	56.8	16.4	9.8	..	0.9	715
Forequarter	18.7	49.1	14.5	17.5	..	0.7	995
Beef, corned, canned, pickled, and dried.							
Corned beef	8.4	49.2	14.3	23.8	..	4.6	1245
Tongue, pickled	6.0	58.9	11.9	19.2	..	4.3	1010
Dried, salted, and smoked	4.7	53.7	26.4	6.9	..	8.9	790
Canned corned beef	..	51.8	26.3	18.7	..	4.0	1270
Veal.							
Breast	21.3	52.0	15.4	11.0	..	0.8	745
Leg	14.3	60.1	15.5	7.9	..	0.9	625
Leg cutlets	3.4	68.3	20.1	7.5	..	1.0	695
Mutton.							
Flank	9.9	39.0	13.8	36.9	..	0.6	1770
Leg, hind	18.4	51.2	15.1	14.7	..	0.8	890
Loin chops	16.0	42.0	13.5	28.3	..	0.7	1415
Lamb.							
Breast	19.1	45.5	15.4	19.1	..	0.8	1075
Leg, hind	17.4	52.9	15.9	13.6	..	0.9	860
Pork, fresh.							
Ham	10.7	48.0	13.5	25.9	..	0.8	1320
Loin chops	19.7	41.8	13.4	24.2	..	0.8	1245
Pork, salted, cured, and pickled.							
Ham, smoked	13.6	34.8	14.2	33.4	..	4.2	1635
Salt pork	..	7.9	1.9	86.2	..	3.9	3555
Bacon, smoked	7.7	17.4	9.1	62.2	..	4.1	2715
Sausage, bologna	3.3	55.2	18.2	19.7	..	3.8	1155
Soups.							
Beef	..	92.9	4.4	0.4	1.1	1.2	120
Meat stew	..	84.5	4.6	4.3	5.5	1.1	365
Poultry.							
Chicken, broilers	41.6	43.7	12.8	1.4	..	0.7	305
Fowls	25.9	47.1	13.7	12.3	..	0.7	765
Goose	17.6	38.5	13.4	29.8	..	0.7	1475
Turkey	22.7	42.4	16.1	18.4	..	0.8	1060

Composition of animal foods.	Refuse.	Water.	Protein.	Fat.	Carbo-hydrates.	Ash.	Fuel value per pound.
Fresh fish.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*
Bass, large-mouthed black, dressed	46.7	41.9	10.3	0.5	. .	0.6	215
Bass, small-mouthed black, dressed	46.4	40.1	11.5	1.3	. .	0.7	270
Bass, sea, dressed	46.8	42.2	10.1	0.2	. .	0.7	195
Bluefish, dressed	48.6	40.3	9.8	0.6	. .	0.7	205
Butterfish, dressed	34.6	45.8	11.7	7.2	. .	0.7	520
Carp (European analysis)	37.1	48.4	12.9	0.7	. .	0.9	270
Cod, dressed	29.9	58.5	10.6	0.2	. .	0.8	205
Flounder, common, dressed	57.0	35.8	6.3	0.3	. .	0.6	130
Haddock, dressed	51.0	40.0	8.2	0.2	. .	0.6	160
Halibut, dressed	17.7	61.9	15.1	4.4	. .	0.9	465
Herring, whole	46.0	37.3	10.0	5.9	. .	0.8	435
Mackerel, dressed	40.7	43.7	11.4	3.5	. .	0.7	360
Mackerel, Spanish, whole	34.6	44.5	13.7	6.2	. .	1.0	515
Perch, white, dressed	54.6	34.4	8.7	1.8	. .	0.5	235
Pickerel, dressed	35.9	51.1	11.9	0.2	. .	0.9	230
Pike, dressed	30.5	55.4	13.0	0.4	. .	0.7	260
Pompano, dressed	45.5	39.5	10.2	4.3	. .	0.5	370
Salmon, California (sections)	5.2	60.3	16.5	17.0	. .	1.0	1025
Salmon, Maine, dressed	23.8	51.2	14.6	9.5	. .	0.9	675
Shad, dressed	43.9	39.6	10.3	5.4	. .	0.8	420
Shad, roe	. .	71.2	23.4	3.8	. .	1.6	595
Sturgeon, dressed	14.4	67.4	15.4	1.6	. .	1.2	355
Trout, brook, dressed	37.9	48.4	11.7	1.3	. .	0.7	275
Turbot, dressed	39.5	43.1	7.9	8.7	. .	0.8	515
General average of fresh fish as sold	42.0	44.0	10.5	2.5	. .	1.0	300
Preserved fish.							
Mackerel, "No. 1," salted	33.3	28.1	14.7	15.1	. .	1.7	910
Cod, salted and dried	24.9	40.3	16.0	0.4	. .	1.2	315
Caviare	. .	38.1	30.0	19.7	7.6	4.6	1530
Herring, salted, smoked, and dried	44.4	19.2	20.2	8.8	. .	0.9	45
Sardines, canned	5.0	53.6	24.0	12.1	. .	5.3	955
Salmon, canned	3.9	59.3	19.3	15.3	. .	1.2	1005
Mackerel, canned	. .	68.2	19.9	8.7	. .	1.3	735
Haddock, smoked, canned	. .	68.7	21.8	2.3	. .	1.6	505
Mollusks.							
Oysters, solid	. .	88.3	6.1	1.4	3.3	0.9	235
Scallops	. .	80.3	14.7	0.2	3.4	1.4	345
Long clams, in shell	43.6	48.4	4.8	0.6	1.1	1.5	135
Round clams, in shell	68.3	27.3	2.1	0.1	1.3	0.9	65
Mussels	49.3	42.7	4.4	0.5	2.1	1.0	140
General average of mollusks (exclusive of canned)	60.2	34.0	3.2	0.4	1.3	0.9	100
Crustaceans.							
Lobster, in shell	62.1	31.1	5.5	0.7	. .	0.6	130
Crawfish, in shell	87.7	10.0	2.0	0.1	0.1	0.1	45
Crab, in shell	55.8	34.1	7.3	0.9	0.5	1.4	185
General average of crustaceans (exclusive of canned)	73.7	20.9	4.3	0.4	0.2	0.5	100
Terrapin, turtle, etc.							
Terrapin, in shell	79.0	15.6	4.5	0.7	. .	0.2	115
Green turtle, in shell	76.0	19.1	4.5	0.1	. .	0.3	90
Average of turtle and terrapin	77.5	17.4	4.2	0.7	. .	0.2	105
Frogs' legs	32.0	57.0	10.2	0.1	. .	0.7	210
General average of fish, mollusks, crustaceans, etc.	44.0	42.5	10.0	2.5	0.1	0.9	295

All fish are best in season; out of season they lose their flavor and have a diminished nutritive value, and in some cases develop an offensive odor.

On account of the rapid changes they undergo by way of decomposition, fish should always be eaten in as fresh a condition as possible. Various methods have been resorted to with a view to preventing these changes. There are many modern contrivances for preserving fish, and drying, smoking, pickling, salting and canning are practised on a large scale.

Crustaceans.—The most popular of the crustaceans are the crab and the lobster. They are highly nutritive, but at the same time highly indigestible. In some persons the crab and the lobster are especially apt to bring on nausea, vomiting, and other and more distressing conditions.

Shell-fish.—Oysters, clams and mussels are the forms of shell-fish chiefly eaten. Oysters, when eaten fresh and raw, constitute the most digestible animal food, but when cooked their digestive value is much lowered. The soft part is proportionately larger and more nutritious than the corresponding portion of the clam. The hard or muscular portion is tough and rather indigestible, and is best omitted from invalid dietaries. Oysters should never be fried for the sick. Oysters have in many cases been the carriers of typhoid fever, and many persons have been infected in this way.

Clams are a popular article of diet and are as agreeable to most palates as oysters. Mussels are consumed chiefly by the poorer classes in the seaport towns of England.

VEGETABLE FOODS.

Vegetable foods differ from animal foods especially in that they contain a large proportion of starch and sugar and comparatively a small amount of protein.

Vegetables do, however, contain a certain amount of proteins and fats.

Carbohydrates of Vegetables.—These are starches and sugars. Starch is found in all plants, and is converted into dextrin by means of dry heat or by cooking. The starch-granules in vegetables are held together by a cellulose framework. Cellulose is a carbohydrate, but is very insoluble; it can be utilized as a food only when young; when old, it is resistant and cannot be digested and hinders the digestion of the starches enveloped by it.

Protein in Vegetables.—These proteins belong mainly to the globulins.

Extractives in Vegetables.—There is a considerable amount of extractive matter in certain vegetables, such as asparagus, which is not utilized in the body.

Fats in Vegetables.—The fats in vegetables are chiefly in the form of oils. In addition, vegetables contain a considerable amount of water and salt. The amount of water varies between 70 and 90 per cent. The main mineral constituents are the salts of potash and soda united with organic acids.

Digestibility of Vegetables.—The digestion of vegetables takes place mainly in the intestines. Owing to the greater bulk of vegetable food and to the cellulose that surrounds vegetable cells and thus prevents the ready access of the digestive juices, vegetable food is not so easily digested as animal food. For convenience of description the following classification of vegetable foods has been adopted:

1. Cereals.
2. Legumes.
3. Roots and tubers.
4. Green vegetables.
5. Fruits.
6. Nuts.
7. Fungi.
8. Lichens.

CEREALS.

Cereals are the most important food-products derived from the vegetable kingdom. Of this class of foods those in commonest use are wheat, corn, rye, oats, barley, rice and buckwheat. The cereals are eaten chiefly after having been ground into flour or meal. Flour is most commonly made from wheat and rye; whereas corn and oats are the chief sources of meal.

Wheat is the most important source of flour, owing to the fact that it can be raised in any temperate climate and yields the best flour at the least expense. It is rich in solids and contains little water.

Flour is made by grinding the grain of the various cereals. Although flour is made chiefly from wheat and rye, barley, oats, maize, etc., are also manufactured into flour.

Bread is made by adding to flour a definite proportion of water, a little salt, and the leavening agent. The mixture or dough is then kneaded, either with the hands or, better, with a spoon. In the large modern bakeries the kneading is done entirely by machinery. After this the dough is set aside for a number of hours, during which time fermentation takes place. It is then molded into loaves and baked. The leavening is dependent upon the action of the yeast on the starch, some of which it converts into sugar, and then into alcohol and carbon dioxid gas. The gas causes bubbles to appear throughout the dough and renders it light and spongy. During the baking process the yeast germs are killed and the

alcohol and carbonic-acid gas are driven off. Hot or fresh bread, when masticated, forms a tenacious, doughy mass, and hence is not so digestible as stale bread.

Biscuits, pastries, and puddings are made by adding to the flour varying quantities of eggs, sugar, milk, butter, fruit, flavoring extracts, etc.

Rice constitutes the staple food of many of the peoples of the Orient. It is grown chiefly in Asia, but is also raised in some parts of Europe. In this country rice culture is confined chiefly to South Carolina. Rice contains a large proportion of starch in very digestible form, but is comparatively poor in other constituents.

Oatmeal is used to the best advantage in making porridge; owing to its lack of gluten it makes only the poorest kind of bread. What is known as Scotch groats is prepared by freeing the grain from its outer husk.

Breakfast Foods.—There are a variety of preparations made from cereals, which have been in recent years placed on the market, the chief characteristics of which are that they have undergone more or less preparation for immediate consumption. For the most part they are sold under trade names; the composition and source of the food is given in some cases and omitted in others. Briefly speaking, they contain about the same amount of nutriment as the cereals from which they are made. Their palatability varies considerably, and there is no objection to the use of such articles of diet if freshly prepared foods are obtained, and the individual that consumes them likes the taste. The older packages, unless very carefully put up, are liable to be infected with insects or moulds, both of which render the product unfit for food. The chief objection is the cost, which is far greater than the same amount of food prepared from the cereal itself.

LEGUMES.

Of the legumes, the pea and the bean are the most important food-products.

The legumes contain a liberal proportion of protein (legumen), carbohydrates, and a little fat, besides a large amount of water. Although legumes contain a proportion of protein in excess of that of meat, a large amount of fat, and considerable starch, they are less easily digested than animal foods. They contain much indigestible fiber (cellulose), and are also very liable to produce fermentation, and in this way occasion flatulence and gastro-intestinal distress. The digestibility of the legumes depends largely upon the manner in which they are prepared and the amount that is eaten. A large portion of the legumes ordinarily eaten is imperfectly absorbed by the intestine.

Beans form one of the oldest forms of vegetable foods, having been cultivated by the ancient Greeks, Romans, and Egyptians. The numerous varieties used for food have all been improved by cultural methods.

There are several varieties of peas, the most important being the field- and the garden-pea. The former is generally used for fodder; but one variety, the Canadian field-pea, is grown for table use. There are many varieties of the garden-pea.

The lentil is but little used in this country. The chief supply of lentils comes from Egypt, very few being grown in Europe. They form a highly nutritious food.

The Soy Bean.—This bean (Glycine hispida), sometimes called the soja bean, is an annual leguminous plant extensively used as a food in China and Japan. Until recently it has been regarded as a botanic curiosity in the Occident. It has recently been extensively used in America as a forage crop, and to improve the soil if ploughed under. The plant is an erect annual, bearing pods con-

taining from two to five beans. There are a large number of different varieties, which vary in size, shape, color, and length of time they take to mature. In the East the bean is used in numerous ways. Some are grown exclusively for the oil they contain, and it is used for culinary, illuminating, and lubricating purposes. The light-colored beans are eaten in soups, and the pods are sometimes picked green, boiled, and served cold, with a sprinkling of soy sauce. The green varieties are often pickled in brine, and eaten moist or dried with meals as appetizers; the same varieties are often slightly sprouted, scalded, and served with meals in winter as a green vegetable. The bean forms the basis of the so-called soy sauces, used as condiments all over the world. The Oriental races most frequently eat the bean in more or less cheesy-like foods which are prepared from it. It may be used in infant feeding to advantage (see same).

Americans may eat the beans in numerous ways, described under the head of Soy Bean Cookery in the recipes at the end of this book. The bean is of particular value in diabetes (see same). It may be used to increase the protein of the diet.

There is some difference in the composition of the different varieties of the bean. An average composition might be stated as water 10 per cent., protein 35 per cent., and fat 18 per cent. There is also some 8 or 9 per cent. of sugar, and the remainder is made up of fiber and non-nitrogenous extract. The Cereo Company, Tappan, N. Y., have made a flour from this bean, which contains about 45 per cent. of protein, 20 per cent. fat, and 9 per cent. sugar. The higher per cent. of protein in the flour is due to the removing of coarse fibrous hulls, which contain but little nutriment. Each ounce of this flour contains about 13 grams of protein and 120 calories.

ROOTS AND TUBERS.

Roots and tubers constitute another class of vegetable foods that are of great importance. They contain both starch and sugar, and to these constituents is due their chief value as a food. On account of the small proportion of protein and the large amount of water they contain, they are inferior in nutritive value to both legumes and cereals.

The **potato** is, for several reasons, the most important member of the group. It is a tuber or thickened underground stem of the Solanum tuberosum. It grows equally well in a variety of soils, and when properly cooked is easily digested.

The **sweet potato** contains more water and sugar but less starch than the white potato. When boiled, it usually becomes mealy, but is often converted into a stringy, sodden mass that is difficult of digestion.

The **beet** contains a very large percentage of starch and sugar. It is raised extensively for the sugar industry, and is also largely employed for making salads to lend variety to the diet.

Carrots, when young and tender, form a very nutritious food and are greatly relished by many persons. They contain from 85 to 90 per cent. of water.

Parsnips, when boiled long enough, form a good food; like carrots, they contain a large proportion of water and a considerable amount of sugar.

GREEN VEGETABLES.

The green vegetables are valuable not only on account of the amount of nutriment present in them, but for the variety and relish they give to the diet. They contain a large amount of salts and have valuable antiscorbutic properties.

Cabbages contain a considerable quantity of sulphur,

and on this account are apt to cause flatulence; where digestion is good, however, they are considered a wholesome form of food.

Cauliflower is the most digestible member of the cabbage family. It may be eaten either as a salad or boiled and served with a milk-sauce.

Spinach is a popular form of vegetable and is used to a great extent. It is valuable chiefly for its laxative effect.

Lettuce is the most important representative of a group of vegetables usually eaten raw. It is made into salad and dressed with vinegar. The various cresses also belong to this class.

Celery, which is usually eaten raw, is stringy and has scarcely any nutritive value. Cooked in milk it forms a wholesome and digestible article of food.

Tomatoes are eaten both raw and cooked, and are refreshing, generally liked, and easily digested. They are used to flavor broths and are valuable for canning purposes, inasmuch as they retain their flavor better than most vegetables.

Asparagus is highly esteemed for its delicate flavor. It is easily digested, even by invalids. It has a slightly diuretic action, and imparts a most offensive odor to the urine, which persists for from twelve to twenty-four hours.

Vegetarianism.—It will not be out of place here to point out the disadvantages of an exclusive vegetable diet. Vegetarians are those who subsist almost entirely upon vegetables, cereals, fruits, and nuts; exceptionally milk and eggs are added to their diet-list. It is quite possible, by the eating of vegetables alone, to supply all the food constituents—carbohydrates, fats, and proteins—that are required by the body. Proteins are obtained partly from vegetables, milk, and eggs; those derived from vegetables, however, are digested with much more

difficulty and absorbed to a much slighter degree than those derived from animal food. Persons subsisting on a purely vegetable diet for any great length of time are apt to lose strength, as well as physical and mental vigor and endurance. Laborers are unable to perform the same amount of work they could accomplish on a diet containing animal food. While vegetables contain large proportions of proteins, in order to supply them in sufficient amount very large quantities must be eaten. This overfeeding is apt in many instances to produce digestive disturbances, particularly in those suffering from gastrointestinal disorders. A purely vegetable diet, if persisted in, is also said to lessen the power of resisting disease.

FRUITS.

Fruits are of little value as nutriment, and are useful mainly to give variety to the diet. They are used extensively as flavoring agents. The chief nutritive constituent of fruits is sugar, and they also contain a small amount of nitrogenous matters, cellulose, starches, organic acids, and a vegetable jelly called pectin, which causes fruit to gelatinize when boiled. The sugar present in fruit is mainly fruit-sugar, or levulose, but some fruits contain, in addition, considerable cane-sugar. In general, fruits contain a large amount of water. The mineral elements of fruit consist of potash, united with tartaric, citric, and malic acids. The flavor and odor of fruits are due to the presence of essential oils and compound ethers.

The digestibility of fruits varies with the kind of fruit eaten and its mode of preparation; stewed fruits are more easily digestible than raw fruits. Among the more easily digestible fruits are oranges, lemons, grapes and peaches; raw apples, pears and bananas are somewhat less digestible.

Oranges and lemons are used in invalid dietaries, their juice allaying thirst very effectively.

Apples are wholesome, digestible, and slightly laxative.

Pears are, as a rule, more easily digestible than apples.

Peaches are wholesome and digestible. They contain less sugar than most fruits.

Bananas are the most nutritious of the raw fruits.

Grapes contain a large amount of water and considerable sugar. When thoroughly ripe they are very digestible.

Raisins are prepared by drying grapes, the white ones being those most used.

Plums and green gages are quite digestible when fully ripe.

Prunes are dried plums. They contain much sugar and are markedly laxative in their effect.

Olives have a bitter taste and are eaten chiefly as a relish with salads. Their nutritive value is due to the oil they contain.

Strawberries are very wholesome unless taken in excess.

Currants, gooseberries, raspberries, huckleberries, mulberries, and a few other berries a contain considerable amount of free acids. They have slightly laxative properties.

Melons contain over 95 per cent. of water and about 5 per cent. of other constituents; they are considered indigestible.

Figs and dates contain large quantities of sugar. The value of the date as a food to the Arab is well known.

NUTS.

Nuts contain a large quantity of fat and a somewhat larger proportion of protein. They have but little food

value and are eaten mainly as a dessert. The average composition of nuts is:

Water	1– 4	per cent.
Protein	6–15	"
Fats	40–50	"
Carbohydrates	6–10	"

Owing to the large amount of cellulose as well as the large proportion of fat they contain, nuts are not easily digested. The dense cellulose framework which makes nuts so indigestible can be destroyed by grinding, and thus the nut made more easily digestible; such preparations as Nuttolene, Bromose, and Nutmeal, of the Battle Creek Sanitarium Company, are prepared in this way.

Almonds contain much fat, but no starch and very little sugar.

Chestnuts contain a small amount of oil and a large amount of carbohydrates.

Walnuts contain a large proportion of protein and fat, but are quite indigestible.

The cocoanut contains a large amount of fat and carbohydrates.

FUNGI, ALGAE, AND LICHENS.

Fungi.—The three varieties of fungi usually eaten are the mushroom, truffle, and morel.

Mushrooms are prized chiefly for their agreeable taste. They possess some nutritive value. Gibson, who has made a study of edible fungi, considers that the usual methods of distinguishing between the edible and poisonous varieties are very unreliable. He suggests the following as being of especial value: First, avoid every mushroom having a cup or suggestion of such at the base; the distinctly fatal poisons are thus excluded. Exclude those having an unpleasant odor, a peppery,

bitter, or other unpalatable flavor, and those of tough consistency. In addition, it is well to exclude those infected with worms, those in advanced age, or partly decayed, and in testing new species they should be kept apart from the others. The best test is to begin with a piece the size of a small pea, chew it very slightly, being careful not to swallow any of the saliva, and finally expel all from the mouth. If no results follow during the interval of a day the experiment may be repeated, swallowing a little of the juice, the fragments of the fungus being expelled as before. In twenty-four hours the third trial may be made, swallowing a small fragment, and if still no unpleasant results follow, the following day a piece the size of a hazel nut may be attempted. In using this method poisonous varieties may be excluded with only a temporary indisposition on the part of the experimentalist, and is the only safe method of avoiding the poisonous varieties. As a rule, any mushroom, omitting the *Amanita*, which is pleasant to taste and agreeable as to odor when raw, is probably harmless, and, if an unfamiliar species, may be tested by the above method.

The **truffle** grows underground and is especially sought for on account of its delicate flavor; the black variety is considered the finest.

The **morel** is usually obtained from France. It is sold in the dried state and is utilized chiefly for seasoning purposes.

Many fungi are poisonous, and these are usually distinguished by a disagreeable odor and taste, and other peculiarities in structure, etc.

Algæ.—The only one of this group that is utilized as food is **Irish moss.**

Lichens.—The only important lichen used as a food is Iceland moss.

The following table, taken from Atwater, gives the chemic composition of the most common cereals:

Cereals.	Water.	Protein.	Fat.	Carbohydrates.		Ash.
				Starch, etc.	Crude fiber.	
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Barley	10.9	12.4	1.8	69.8	2.7	2.4
Buckwheat	12.6	10.0	2.2	64.5	8.7	2.0
Corn (maize)	9.3	9.9	2.8	74.9	1.4	1.5
Kafir corn	16.8	6.6	3.8	69.5	1.1	2.2
Oats	11.0	11.8	5.0	59.7	9.5	3.0
Rice	12.4	7.4	0.4	79.2	0.2	0.4
Rye	11.6	10.6	1.7	72.0	1.7	1.9
Wheat;						
Spring varieties	10.4	12.5	2.2	71.2	1.8	1.9
Winter varieties	10.5	11.8	2.1	72.0	1.8	1.8

The following table, taken from Hutchison, gives the chemic composition of some fruits:

Fruits.	Water.	Proteid.	Ether extract.	Carbohydrates.	Ash.	Cellulose.	Acids.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Apples	82.50	0.40	0.5	12.5	0.4	2.7	1.0
Pears	83.90	0.40	0.6	11.5	0.4	3.1	0.1
Apricots	85.00	1.10	0.6	12.4	0.5	3.1	1.0
Peaches	88.80	0.50	0.2	5.8	0.6	3.4	0.7
Green gages	80.80	0.40	0.2	13.4	0.3	4.1	1.0
Plums	78.40	1.00	0.2	14.8	0.5	4.3	1.0
Cherries	84.00	0.80	0.8	10.0	0.6	3.8	1.0
Currants	85.20	0.40	0.8	7.9	0.5	4.6	1.4
Strawberries	89.10	1.00	0.5	6.3	0.7	2.2	1.0
Blackberries	88.90	0.90	2.1	2.3	0.6	5.2	1.6
Raspberries	84.40	1.00	2.1	5.2	0.6	7.4	1.4
Cranberries	86.50	0.50	0.7	3.9	0.2	6.2	2.2
Grapes	79.00	1.00	1.0	15.5	0.5	2.5	0.5
Watermelons	92.90	0.30	0.1	6.5	0.2	1.0	0.5
Bananas	74.00	1.50	0.7	22.9	0.9	0.2	0.5
Oranges	86.70	0.90	0.6	8.7	0.6	1.5	1.8
Lemons	8.93	1.00	0.9	8.3	0.5	1.5	1.8
Pineapples	8.93	0.04	0.3	9.7	0.3	1.5	7.0
Dates, dried	2.08	4.40	2.1	65.7	1.5	5.5	7.0
Figs, dried	2.00	5.50	0.9	62.8	2.3	7.3	1.2
Prunes, dried	2.64	2.40	0.8	66.2	1.5	7.3	2.7
Raisins	1.40	2.50	4.7	74.7	4.1	1.7	2.7

The following table, compiled from Atwater, Abel, and Hutchison, gives the chemic composition of some vegetables:

Vegetables.	Water.	Protein.	Fat.	Carbohydrates.	Ash.	Fuel value per pound.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories.*
Fresh legumes:						
String-beans	89.2	2.30	0.3	7.4	0.8	195
Sugar peas or string-peas	81.8	3.40	0.4	13.7	0.7	335
Shelled kidney beans	58.9	9.40	0.6	29.1	2.0	740
Shelled Lima beans	68.5	7.10	0.7	22.0	1.7	570
Shelled peas	74.6	7.00	0.5	16.9	1.0	465
Canned string-beans	93.7	1.10	0.1	3.8	1.3	95
Canned Lima beans	79.5	4.00	0.3	14.6	1.6	360
Canned kidney beans	72.7	7.00	0.2	18.5	1.6	480
Canned peas	85.3	3.60	0.2	9.8	1.1	255
Dried legumes:						
Lima beans	10.4	18.10	1.5	65.9	4.1	1625
Navy beans	12.6	22.50	1.8	59.6	3.5	1605
Lentils	8.4	25.70	1.0	59.2	5.7	1620
Dried peas	9.5	24.60	1.0	62.0	2.9	1655
Peanuts	9.2	25.80	38.6	24.4	2.0	2560
St. John's bread (carob bean)	15.0	5.90	1.3	75.3	2.5	1565
Potatoes	62.6	1.80	0.1	14.7	0.8	295
Sweet potatoes	55.2	1.40	0.6	21.9	0.9	440
Beets	70.0	1.30	0.1	7.7	0.9	160
Parsnips	66.4	1.30	0.4	10.8	1.1	230
Turnips	62.7	0.90	0.1	5.7	0.6	120
Cabbage	89.6	1.80	0.4	5.8	1.3	165
Cauliflower	90.7	2.20	0.4	4.7	0.8	175
Sea-kale	93.3	1.40	0.4	3.8	0.6	175
Spinach	90.6	2.50	0.5	3.8	1.7	120
Vegetable marrow	94.8	0.06	0.2	2.6	0.5	120
Brussels sprouts	93.7	1.50	0.1	3.4	1.3	95
Tomatoes	91.9	1.30	0.2	5.0	0.7	105
Greens	82.9	3.80	0.9	8.9	3.5	275
Lettuce	94.1	1.40	0.4	2.6	1.0	105
Celery	93.4	1.40	0.1	3.3	0.9	85
Rhubarb	94.6	0.70	0.7	2.3	0.6	105
Water-cress	93.1	0.70	0.5	3.7	1.3	110
Cucumber	95.9	0.80	0.1	2.1	0.4	70
Asparagus	91.7	2.20	0.2	2.9	0.9	110
Sauerkraut	91.0	1.40	0.7	2.9	1.7	110

SUGARS.

Sugars are carbohydrates that contain hydrogen and oxygen in a proportion to form water. Sugar is one of the most valuable and popular forms of food. This popularity is due not only to its nutritive value, but also to its pleasant taste. According to Abel, 86 pounds of sugar per capita were consumed in England in 1895 and 64 pounds in the United States in the same year. From 7,000,000 to 8,000,000 tons are consumed annually in the different countries of the world. The principal variety of sugar in use is cane-sugar; besides this, grape-sugar, fruit-sugar, and milk-sugar also enter into the composition of our foods. Sugar is obtained in a fluid state, as in honey, as well as in crystalline form.

Sugar is very fattening and at the same time is also a great source of muscular energy. Most of the ill effects attributed to the use of sugar are due to the fact that more than one-quarter of a pound is consumed daily (Hutchison); this amount may be taken with impunity by the healthy adult, but if more be taken, it will be excreted rapidly by the kidneys, giving rise to a condition known as temporary or alimentary glycosuria.

Sugar can be absorbed only as dextrose and as levulose, all varieties of sugar being converted into these forms before they are absorbed. In strong solution sugar irritates the mucous membrane of the stomach and is apt to undergo fermentation, and thus produce gastro-intestinal distress.

Cane-sugar is the most common and most extensively used form of sugar. It is made chiefly from sugar-cane and from the sugar-beet. When pure, it consists of a mass of white crystals.

Candy contains a large amount of sugar, besides but-

ter and other fats, starch, nuts, flavoring extracts, etc. The chief varieties of candy are made up largely of glucose and starch, colored with anilin dyes.

Molasses, Treacle, and Syrup.—Molasses and treacle are by-products formed in the manufacture of cane-sugar. Molasses forms a highly nutritious food. On account of the impurities it contains, molasses has a more pronounced aperient effect than refined syrup.

Glucose, or grape-sugar, is chiefly made from starch by inversion or hydrolysis. It is not nearly so sweet as cane-sugar and crystallizes with difficulty. It is present in small quantities, in combination with other varieties of sugar, in most fruits.

Lactose, or **sugar of milk,** is the natural carbohydrate for the young, growing infant. It is less abundant in cows' milk than in human milk.

Honey is sugar in a concentrated solution. It is made by bees from the nectar gathered from various flowers. It contains a crystallizable sugar resembling glucose, and a non-crystallizable form.

Saccharin is used largely as a substitute for sugar in cases of rheumatism and diabetes.

Levulose, or **fruit-sugar,** is also utilized as a form of sugar in certain cases of diabetes.

SPICES AND CONDIMENTS.

Spices and condiments play an important rôle in increasing the appetite and aiding the digestive functions; they have practically no nutritive value. By the action of these substances on the organ of taste as well as on the mucous membrane of the stomach, the appetite is stimulated and the secretion of gastric juice increased. In certain gastric disturbances, as well as in diseases of the kidneys. they act as irritants and should be avoided.

The **peppers** are among the favorite spices; there are two varieties, the white and the black.

Mustard.—Mustard is used chiefly in salads or with other foods, and has a marked tendency to increase the appetite. In large quantities and diluted with water mustard acts as an irritant to the stomach, producing nausea and vomiting.

Vinegar is produced from various alcoholic drinks and from fruits. It contains 5 per cent. of acetic acid.

Horseradish is a condiment that is much used with various foods.

Sauces, such as tomato, catsup, Worcestershire, and the like, increase the appetite and give a relish to certain foods.

Spices act merely by adding a flavor to foods, in this way increasing the appetite for foods that would otherwise be insipid. Those most in use are ginger, cinnamon, nutmeg, and cloves.

FATS AND OILS.

One-fifth of the body-weight consists of fat. This is obtained in part from fatty food and in part from the carbohydrates and the proteins. Most of the heat energy furnished the body is supplied by fat; it oxidizes very rapidly, and in this way spares the protein elements that would otherwise be required to furnish energy. Fats are digested in the intestine, where they are emulsified previous to being absorbed. The most useful forms of fat are cream and butter; other forms are bacon and cod-liver oil. When eaten too liberally, fats are liable to cause indigestion, and when this exists they should be taken only in very restricted quantities.

Foods fried in fats are indigestible, and hot fats are more indigestible than cold. Fats and oils have a ten-

dency to relieve constipation, but are contra-indicated in diarrhea.

The most important animal fats are butter, cream, lard, suet, oleomargarin, cottolene, butterine, cod-liver oil, and bone-marrow. Of the vegetable fats, those most commonly employed are olive oil, cottonseed oil, linseed oil, cocoa-butter, and the oils obtained from nuts, such as cocoanut oil, peanut oil, and almond oil. Fatty foods are indicated especially in wasting disorders and in convalescence from certain acute diseases.

There are many proprietary fatty foods on the market, some of which are worthy of mention. In most of these the fats, usually **cod-liver oil,** have been emulsified; this emulsification aims to make the oil less objectionable to the taste and also to render it more easily digestible.

Intolerance to Fat.—Intolerance to fat is frequently noted in infants and also in older individuals. In infants it may produce vomiting one or two hours after feeding, or there may be colic and either large white stools, or, less frequently, thin, greenish ones. Sooner or later there is a marked disturbance of the general health, and the children are usually, though not always, pale and thin. Many such children are given large quantities of fatty food, cream, butter, and oil, with the idea of fattening them up, with the result that the children's general health is very markedly interfered with.

Butterine is a fat prepared from beef and hog fats, and is frequently used in this country instead of butter; oleomargarin is a similar preparation made from beef fat. Both butterine and oleomargarin are wholesome fatty foods, the only objection raised against them being that they are often sold fraudulently for butter.

Bone-marrow is a fat obtained from the large bones of

the ox. It is used in the treatment of tuberculosis and in the various forms of anemia.

SALTS.

The various salts that enter into the composition of the tissues of the body are absolutely necessary for the maintenance of life. The most important, and by far that most universally found, is sodium chlorid, or common table salt. It enters into the formation of all the tissues and secretions of the body with the exception of the enamel of the teeth. It forms about 60 per cent. of the salts of the blood. When taken in insufficient quantities or omitted entirely marked symptoms of malnutrition soon appear.

Potassium chlorid ranks next in importance to sodium chlorid. It is widely distributed in the body, but occurs in much smaller amounts.

Calcium salts are important chiefly on account of the extent to which they enter into the composition of the bones and the teeth.

Phosphorus occurs in the muscles, bones, and blood. It is found as phosphate in both animal and vegetable food.

The **sulphur** of the body is derived from egg albumin, milk, and certain vegetables, in which it occurs as sulphates.

Iron is an important constituent of the hemoglobin of the blood, and is found also in muscle-fibers.

BEVERAGES AND STIMULANTS.

WATER.

WATER is the chief constituent of all beverages, and also enters largely into the composition of solid food. The human body itself is composed of about 60 per

cent. of water. While man can live for weeks without food, he can abstain from water for but a few days. Water is absolutely necessary as a solvent, and as it is constantly being eliminated by the skin, lungs, and kidneys, this loss must be replaced by some means in order to maintain the functions of the body. This is most conveniently done through the agency of the various beverages. The best method, however, of replenishing the water-supply is that of drinking the water in its pure state, when it retains all its solvent properties. Some waters are taken for their laxative or purgative action, and others for the salts which they contain.

The amount of water consumed daily by the average person is from six to eight glasses. This varies, however, with the amount and variety of food and exercise taken. The age, sex, and size of the individual and the season of the year also influence the total daily consumption of water. In very warm weather, for example, and under severe physical strain, much water that would not be lost in the cold season of the year is eliminated in the form of perspiration and must be compensated for.

Water is absorbed chiefly in the intestine; a small amount is absorbed in the stomach, and but a very trifling amount, if any, in the mouth. The water absorbed in the intestine is passed into the lymphatics and carried on into the circulation, whence it is eliminated.

As previously stated, water is eliminated through the skin, kidneys, lungs, and feces. The amount of water excreted daily varies greatly under special conditions. In cold weather the skin is inactive and the kidneys excrete a markedly greater amount of water than in hot weather, when the sweat-glands functionate more actively. When there is a tendency toward liquid movements from

the bowel, the elimination by the kidneys is lessened. In warm weather elimination by the lungs is stimulated.

According to the amount of mineral water they contain, waters are classed as hard or soft. Rain-water is soft, and is the purest form of natural water. The hardness of water is due to earthy carbonates; by boiling, the carbonic acid gas is driven off and the carbonates are precipitated, and the water thus rendered more suitable as a beverage. Boiling has the additional advantage that it destroys most of the micro-organisms that may be present in the water.

Water often contains impurities, such as lime, magnesia, iron, and other salts, and micro-organisms, and it often becomes necessary to purify it for drinking purposes. Typhoid fever and cholera are communicated chiefly through the agency of polluted drinking-water. The best method of purification is by distillation, by which means both organic and inorganic impurities can be removed or rendered innocuous. This method is now used largely on shipboard. When distilled and aërated, sea-water makes a most pleasant beverage. Water may also be purified by means of filtration, charcoal and sand being used extensively for this purpose. Porcelain cylinders are also in common use. Whatever the filtering agent employed, unless it be kept clean it is liable to become a source of contamination rather than of purification. Owing to the fact that soluble impurities often pass through the filter, filtered water is not nearly so reliable as distilled water.

Mineral Waters.—Mineral waters are frequently taken as substitutes for ordinary water; at times they produce a most marked stimulating effect on various

organs. Their efficiency is greatly enhanced when a "drinking cure" is combined with proper dietetic regulations. Mineral waters differ from ordinary waters in the greater amount of gaseous and solid matters they contain. The gaseous constituents of mineral waters are mainly carbon dioxid and sulphuretted hydrogen. The solid constituents are salts of sodium, potassium, magnesium, aluminium and calcium, iron, iodin, bromin, chlorin and sulphur. Taken before meals, waters containing carbonic acid have a soothing effect on an irritated stomach. Taken in excess, all carbonated waters are apt to produce indigestion.

Some waters have a purgative effect, others a laxative, and still others a diuretic. **Thermal waters** issue hot from their springs, their virtue being said to be due to their heat. Some mineral waters have no medicinal virtue whatever, and are utilized merely as drinking-water.

The following classification of mineral waters is taken from Cohen's *Physiologic Therapeutics*, Vol. IX.:

I. Alkaline mineral waters.	Simple acidulous contains large amounts of carbon dioxid; example, Apollinaris. Alkaline acidulous contains large amounts of carbon dioxid and also sodium carbonate; example, Saratoga Vichy. Alkaline muriated acidulous contains carbon dioxid, sodium carbonate, and sodium chlorid; example, Seltzer. Alkaline saline acidulous contains sulphate of soda in addition to bicarbonate and chlorid of soda, as Carlsbad water.
II. Sodium chlorid waters.	Simple sodium chlorid contains sodium chlorid and carbon dioxid, as Saratoga Congress. Sodium chlorid with iodin and bromin contains iodin and bromin in addition to sodium chlorid, as Saratoga Kissingen.

III. Bitter waters contain a large proportion of sodium sulphate and magnesia sulphate, as Bedford Magnesia water.

IV. Sulphurous waters contain hydrogen sulphid or some other sulphur compound, as French Lick Spring.

V. Iron-waters.
- Carbonated iron-waters contain larger quantities of carbonic acid, as Cresson Spring water.
- Sulphated iron-waters contain ferrous sulphate in addition to sodium magnesia, and calcium sulphate, as Sharon Chalybeate Spring.
- Iron-and-arsenic-water contains arsenic and iron, as Harbin Hot Sulphur Spring.

VI. Earthy mineral waters contain large amounts of calcium and magnesium salts, as Mount Clemens Mineral Springs.

VII. Acratothermal waters do not contain any active mineral ingredients, but are obtained at a temperature of 85° F. or over.

TEA.

Tea is a preparation made from the leaves of an evergreen plant known as thea. It is grown in China, Japan, India, Ceylon, and in North Carolina. There are two great classes of tea, the green and the black.

The chief difference between the black and the green tea lies in the fact that black tea is fermented, while green is not. As in the process of fermentation the tannic acid becomes less soluble, black tea contains much less tannic acid than green tea.

Tea has practically no nutrient ingredients. Its principal constituents are caffein and tannic acid, and its special aroma is due to a volatile oil. It owes its stimulating effect to the presence of caffein. As the action of tannic acid is detrimental to the process of digestion, tea should be so prepared as to contain as large a proportion of caffein as possible and the smallest possible amount of tannic acid.

When the leaves are placed in boiling water, caffein is extracted very rapidly. Tannic acid, however, is much

less soluble; it follows, therefore, that in order to have as little tannic acid in the tea as possible, the leaves should be boiled in water for as short a time as practicable. To prepare the infusion, pour boiling water on the tea-leaves and allow the mixture to stand where it will keep hot, though not boil, for from three to five minutes. The water used in preparing tea should not be hard or stale.

COFFEE.

Coffee was introduced into Europe in the same century as tea, and only a few years later. It is prepared from the seeds of Coffea arabica, which was originally grown in Arabia. The aroma of coffee is due to the presence of caffeol, an oil liberated in roasting. Coffee is often adulterated, chicory, acorns, and other substances being added for this purpose. The adulteration may not be injurious in its effect, but alters sometimes, even agreeably, the flavor of the coffee.

Preparation of Coffee.—In order to obtain coffee of the finest flavor, the beans should be roasted and ground shortly before they are to be used, as the flavor is impaired by exposure to the air after grinding. The water should have reached the boiling-point before it is poured over the coffee. The pot should then be placed for a few moments in a hot place, but boiling must not be allowed to continue, or the aroma will be lost and the coffee contain too large a percentage of tannic acid.

The **effect of coffee** on the system is that of a stimulant, due to the caffein present; it acts directly on the brain centers, stimulates the heart, and deepens the respirations. It is an excitant of the nervous system, and in some persons produces nervousness, excitability, and insomnia; in others it acts as an agreeable stimulant.

COCOA.

Cocoa was introduced into Europe long before either coffee or tea. It is prepared from the seeds of the cacao tree. The seeds are contained in a pulpy fruit, somewhat resembling a cucumber, from which they are extracted. Cocoa, as ordinarily prepared, is made by grinding the seeds into a paste, to which sugar or starch is added; if starch is used, the cocoa is boiled for a few minutes, but if sugar is added, the cocoa only requires the addition of boiling water or milk.

Cocoa, while a stimulant, is less apt to induce nervous symptoms, such as sleeplessness and palpitation, than either tea or coffee. By reason of the large proportion of sugar and fat contained in it, however, when used in excess, cocoa is likely to produce indigestion. When not too rich, it forms a nutritious drink especially useful for children and for convalescents.

Chocolate is prepared by adding starch, sugar, and such flavoring substance as vanilla to cocoa. In addition to their stimulant effect, cocoa and chocolate possess a marked nutrient value not possessed by either tea or coffee.

ALCOHOL.

Alcohol is produced by the fermentation of sugars with yeast. The principal constituent in all alcoholic beverages is ethyl alcohol. The glucose contained in fruits is fermented directly into alcohol; whereas the starches in such substances as potatoes, grains, etc., are converted into dextrin and maltose, and then, by the aid of diastatic ferments, before the alcoholic fermentation can take place, they are converted into glucose.

The **food value of alcohol** has been a subject for discussion for many years. Although all admit that

alcohol taken in excess is a poison and is detrimental to health, yet opinions differ widely as to the food value of alcohol taken in moderate quantities. There are those who maintain that alcohol, even in small quantities, is detrimental to health and acts as a poison; whereas others believe that, on the contrary, when taken in small quantities it possesses a considerable nutrient value and is to be recommended as a valuable food. The most recent as well as the most exhaustive work bearing on this subject has been done by Atwater, in his experiments on "The Nutritive Value of Alcohol," in The Physiologic Aspects of the Liquor Question, 1903. According to the writer the effect of alcohol in small quantities is slightly to increase the digestibility of protein, but not to alter the digestibility of other nutrients—that is, carbohydrates and fats; that at least 98 per cent. of the alcohol ingested is oxidized in the body, whereas ordinarily 98 per cent. of the carbohydrates, 95 per cent. of the fats, and 93 per cent. of the protein are oxidized; the alcohol is therefore oxidized more completely than are the nutrients of ordinary foods.

The conclusion reached by Atwater, based on direct experiments, is that the fat protection following the use of alcohol is very slightly different from that following the taking of ordinary food, and that alcohol protects the body-fat quite as effectively as do the fats and carbohydrates of the food for which it is substituted. The power of alcohol to protect the protein of food or body-tissue, or both, from consumption is clearly demonstrated.

Alcohol, carbohydrates, and fats replace one another as sources of energy, so that as one is oxidized the other is correspondingly spared.

Atwater found that in most of the experiments "alco-

hol was certainly a source of heat for the body" and contributed its share of energy for muscular work.

Atwater gives the following proportions as to the availability and fuel value of alcohol in nutrition as compared with carbohydrates and fats: 1 gm. of alcohol, $1\frac{3}{4}$ gm. of carbohydrate, and $\frac{3}{4}$ gm. of fat yield the same amount of energy to the body. Inasmuch as alcohol contains no nitrogenous constituents, it can not be looked upon as a food tending to repair tissue, but merely as a fuel that, on oxidizing, forms animal heat.

Alcohol is easily digested and readily absorbed in the alimentary tract; as a food, however, it is costly, and the danger of addiction and excess in its use is great. The habitual use of alcohol even in considerable quantities does not tend to produce injurious effects in many persons; whereas in others changes, especially of a cirrhotic nature, in the tissues, blood-vessels, liver, kidneys, etc., are liable to occur. In certain diseases, especially those accompanied by malnutrition, extreme feebleness, and exhaustion, alcohol acts as a food and serves an excellent purpose in restoring strength to a weak and enfeebled body.

Alcoholic beverages are divided into several classes, *e. g.*, spirits, liqueurs, and bitters, malt liquors, wines, etc.

SPIRITS.

Spirits are produced by fermenting saccharine substances and obtaining the alcohol by distillation. Of the substances, corn, rice, barley, molasses, and potatoes are those most commonly utilized for this purpose. In addition to the alcohol, by-products are formed, and it is to these that spirits owe their characteristic flavor and odor. The by-products contain the higher alcohols, such

as propyl, butyl, and amyl alcohol, a mixture of these forming what is known as fusel oil.

Whisky.—The United States Pharmacopeia defines whisky as "an alcoholic liquid obtained by distillation of the mash of fermented grain (usually of mixtures of corn, wheat, and rye), and at least two years old." Whisky possesses an alcoholic strength of from 50 to 58 per cent. by volume. It should be free from disagreeable odor. The ether and aldehyds contained in whisky become altered in character as it ages, and the flavor is thus rendered more agreeable.

Brandy.—In the United States Pharmacopeia brandy is defined as an "alcoholic liquid obtained by distillation of the fermented unmodified juice of fresh grapes, and at least four years old." Brandy contains from 46 to 55 per cent. by volume of alcohol. The quality of brandy depends upon the variety of grapes used and upon the length of time the brandy is allowed to stand: the older the brandy the better the quality. With brandy, just as with whisky, on standing ethers and aldehyds are produced, to which the special flavor of the brandy is due. The color of brandy is due to the tannic acid extracted from the oak casks in which the brandy is contained. There are many inferior grades of brandy on the market, some being merely alcohol colored and flavored with various essences.

Rum.—Rum is the product of the distillation of fermented molasses, its flavor being due to certain by-products.

Gin.—Gin is produced by the distillation of rye and malt mash, its flavor being due to juniper berries which are added during fermentation.

Liqueurs or **cordials** and **bitters** contain a large

proportion of alcohol and a high percentage of sugar and essential oils.

Malt Liquors.—Under the heading of malt liquors are included beer or ale and stout or porter. These beverages are made by fermenting malt and hops. The mild or bitter beers are distinguished by the relative proportion of hops contained in them; the milder forms contain considerable quantities of hops, whereas the bitter ones contain but small amounts.

Porter and Stout.—Porter and stout are made by fermenting malt, the latter, however, being roasted, during which process a certain amount of caramel is produced. It is to this substance that the dark color is due. Beer as well as stout contains from 3 to 8 per cent. of alcohol, from 2 to 5 per cent. of dextrin, and from 0.5 to 1 per cent. of sugar.

WINE.

Wine is produced by the fermentation of grape-juice, the juice being first pressed from the grape by crushing. There are a number of factors, such as the character of the grape utilized, its cultivation, and the method of manufacturing, that enter into the production of a good wine.

Of the important ingredients of wine may be mentioned water, acids, alcohol, sugar, ethers, glycerin, and extractives.

Acids.—The most important acids contained in wine are tartaric, malic, and tannic; others of less importance are acetic and succinic. The total amount of acids in wine varies, but rarely exceeds 0.5 per cent.

Alcohol.—There are several alcohols present in wine; ethyl alcohol occurs in largest quantity; amyl, propyl,

and butyl alcohol are also present in varying amounts; natural wine never contains more than 16 per cent. of alcohol; if it contains more than this amount it has been "fortified." This is often done, especially when the wine is to be shipped from warm countries to foreign districts, to prevent it souring.

Sugar.—Sour wines contain about 1 per cent. and sweet wines about 4 per cent. of sugar; it is evident, therefore, that sugar is present in too small a quantity to be of any food value.

Ethers.—Many varieties of ethers are present in wine; they are produced by the action of the alcohols and acids upon each other. It is to the character and quantity of the ethers contained in them that the flavor of various kinds of wines is largely due.

Glycerin.—Glycerin is present in wine in about one-fourteenth of the volume of the alcohol.

Extractives.—A large part of the solid material of the wine is made up of extractives.

Varieties of Wines.—From a dietetic standpoint the classification of Chambers is probably the most practical; according to this author, wines are divided into seven classes: 1. Strong dry wines. 2. Strong sweet wines. 3. Aromatic wines. 4. Acid wines. 5. Sparkling wines. 6. Perfect wines. 7. Rough or astringent wines.

1. **Strong Dry Wines.**—These are wines that contain a large percentage of alcohol, to which, as a rule, additional alcohol has been added in their production; in other words, they are "fortified." Examples of this class of wines are port, sherry, and Madeira. Port contains from 15 to 20 per cent. of alcohol and considerable

tannic acid. Sherry is a fortified wine; it contains from 15 to 22 per cent. of alcohol.

2. **Strong Sweet Wines.**—These wines contain fruit-sugar in quantities sufficient to act as a preservative and prevent further fermentation. Under this head may be mentioned Tokay, Malaga, and sweet champagne. They contain from 18 to 22 per cent. of alcohol and from 3 to 5 per cent. of sugar. Owing to their sweetness they are taken in small quantities.

3. **Aromatic Wines.**—Aromatic wines possess a superior flavor and contain essential oils and considerable alcohol; examples of this class of wines are Moselle, Capri, and some of the Rhine wines.

4. **Acid Wines.**—The distinguishing feature of this class of wines is the large quantity of acid they contain.

5. **Sparkling Wines.**—Sparkling wines contain considerable quantities of carbonic acid gas, to which their exhilarating effect is due. The chief variety of this class of wines is champagne. The dryness or sweetness of champagne depends upon the proportion of cane-sugar and cognac added during the process of manufacture. In the manufacture of dry champagne 8 per cent. of sugar is added, while the sweet brands contain as much as 16 per cent.

6. **Perfect Wines.**—Perfect wines are defined by Chambers as those containing alcohol, water, sugar, ethereal flavors, fruity extractives, and acids. Under this head come Burgundy and Bordeaux.

7. **Rough Wines.**—Rough wines contain considerable quantities of tannic acid, to which they owe their astringent effect. They contain little alcohol and are of slight value for medicinal purposes.

ACTION AND USE OF MALT LIQUORS AND WINES.

Malt liquors, when taken in moderate quantities, seem to aid digestion, increase the appetite, and stimulate gastric secretion. Occasionally, especially in those who lead a sedentary life, they give rise to indigestion and gastric acidity. On account of the large quantities of carbohydrates they contain, they have considerable food value. The use of malt liquors is contra-indicated especially in such conditions as gout, obesity, diabetes, and diseases of the urinary tract.

Wines appear to exert a depressing effect on the gastric secretion. Taken in moderate quantities, however, by increasing the appetite and the motor function of the stomach, this depressing effect is not only overcome, but the digestion is also greatly improved.

Cider is a beverage prepared from the fermented juice of ripe apples. The amount of alcohol contained in this beverage varies between 3 and 8 per cent. by volume. It also contains malic acid, salts, sugar, albuminoids, and extractives.

CHAPTER III.

VARIOUS FACTORS IN THEIR BEARING ON DIET.

CONCENTRATION OF FOOD.

CONCENTRATED foods are those from which the larger portion of the water present has been abstracted, and thus the weight and the bulk of the food diminished. There are many patented concentrated foods on the market. They find their chief use in the treatment of patients who take too little of the usual forms of food to maintain strength, and, second, in cases where it is important that a large quantity of nourishment be taken.

Food can be concentrated to various degrees. Desiccated meat is the most concentrated form of protein; sugar the most concentrated form of carbohydrate; and olive oil the most concentrated form of fat.

1. **Concentrated Proteins.**—These foods are prepared from milk, meat, eggs, and vegetables. Meat is concentrated by drying, and in this form it is generally indigestible, which can, however, be overcome by predigestion or powdering.

2. **Concentrated Vegetables.**—Many vegetables, such as potatoes, carrots, cabbage, and the like, are concentrated by drying. They are utilized only in those instances in which it is impossible to secure fresh vegetables.

Bread is frequently dried and eaten in the form of "hardtack," when it is impossible, as during sea-voyages, to obtain fresh bread.

PRESERVATION OF FOOD.

By preservation of food is meant the process by which the food is so changed that it can be kept for a longer or shorter period of time without undergoing putrefaction. The process of fermentation is induced by micro-organisms present in the atmosphere coming into contact with the food and contaminating it. Since putrefactive germs require a certain amount of moisture and heat for their growth, such foods as contain little water and that are not kept too warm are not so likely to undergo decomposition; on the other hand, foods containing much water undergo fermentation very rapidly. To prevent this process, four methods of preservation are, according to Yeo, available:

1. Drying.
2. Exclusion of air.
3. Exposure to cold.
4. Treatment with antiseptic chemic agents.

1. **Drying.**—By this process a large proportion of the water is abstracted. Vegetables, such as carrots, peas, potatoes, etc., are preserved by drying. Milk, in the form of nutrose, eggs, as egg-powder, and fruits are often preserved in this manner.

2. **Exclusion of Air.**—Air may be prevented from coming into contact with food in a number of ways: by immersing the food in oil or fat; by heating the food, so as to evaporate the external layers; by coating with some impermeable substance, as oil, salt, sawdust, varnish, or paraffin. Fish are frequently preserved by immersion in oil or by smoking. Ham and bacon are preserved by smoking, by which process the outer surface becomes coagulated and impermeable. Eggs are pre-

served by covering the fresh eggs with some impermeable substance, such as oil, fat, beeswax, or sawdust. In order properly to preserve food by exclusion of air, it is highly important that the food be perfectly fresh, and that any air that may be present be expelled.

In canning, the food to be preserved is heated in tin cans until steamed, when, all the air having been expelled, the can is soldered and rendered air-tight.

3. **Exposure to Cold.**—Food can be preserved indefinitely by ice. Meat and fish, which are often preserved by this means, should be cooked at once after thawing. Frozen meat loses about 10 per cent. more of its nutritive value in cooking than fresh meat. Frequently food is not kept directly on ice, but in refrigerating chambers.

4. **Treatment with Antiseptic Chemic Agents.**—
1. **Salting.**—The salting of food is a method that has been practised for many centuries. In this way meat and fish are easily preserved. The pale color of the meat produced by salting is overcome by adding a little saltpeter in addition to common salt. After the salting has been accomplished, it is often followed by smoking.

2. **Sugar in strong solution** acts as an antiseptic, and fruits are thus often preserved in concentrated syrups.

3. **Vinegar** acts as an antiseptic in preserving cucumbers, pickles, oysters, etc.

4. **Other Antiseptics for Preserving Foods.**—Among these substances are sulphur vapor; weak carbolic acid; strong acetic acid; injections of alum and aluminium chlorid into the blood-vessels; boric acid; borax; salicylic acid; formaldehyd.

The use of antiseptics to preserve foods is usually condemned, and laws have been enacted to prevent the

adulteration of such foods as milk, beer, etc., with antiseptics, as salicylic acid, formaldehyd, etc. While small quantities of these substances, even taken for a considerable length of time, may not prove injurious, in large quantities they are dangerous.

ARTIFICIAL FOOD PREPARATIONS.

To this class of foods belong those preparations that are so concentrated as to furnish a large amount of food in small bulk; being of small bulk, they can be added to liquid foods, and thus the nutritive value of the latter increased without increasing the total quantity of liquid taken. A number of these preparations have been mentioned under the head of beef-juices and meat-powders. The various casein preparations, among which may be mentioned nutrose, eucasein, sanose, and plasmon, are artificial foods.

Among other artificial food preparations may be mentioned: 1. Pemmican. 2. Peptone products. 3. Mosquera "Beef Meal." 4. Somatose. 5. Legumin. 6. Aleuronat.

1. **Pemmican** is prepared by cutting meat into thin slices and allowing them to dry; sugar and dried fruits are added, the nutritive value of the meat being thereby increased.

2. **Peptone products** are predigested protein foods. When given in large quantities they tend to produce diarrhea, and are objectionable to many patients on account of their disagreeable taste. Among the principal peptone products manufactured may be mentioned Kemmerich's, Koch's, Benger's, Savory & Moore's, Carnrick's, Armour's Wine of Beef Peptone, and Panopeptone.

3. **Mosquera Beef Meal** is prepared by partially digesting meat by means of a ferment obtained from

pineapple juice. According to Chittenden, this product contains 90 per cent. of nutritive matter (13 per cent. of fat and 77 per cent. of protein).

4. **Somatose** is a predigested meat consisting of albumoses. It is a yellowish powder, tasteless, odorless, and highly nutritious, and is usually well borne even in gastric disturbances.

5. **Legumin** consists of the casein of the legumes, and is a highly nutritious protein food.

6. **Aleuronat** is a brownish powder, chiefly utilized as a food for diabetics. It contains 80 per cent. of protein.

7. **Tropon** is prepared mainly from fish and vegetables, and as sold on the market appears as a brownish, tasteless powder. It is eaten mixed with broths or gruels.

Artificial Proprietary Foods.—A large number of proprietary foods designed as substitutes for milk for infants and invalids are on the market. Infants fed upon such foods alone are apt to become rachitic. Some of these foods have little food value; especially the amylaceous foods in which the starch has not been predigested. Many of these preparations contain too little fat and far too great a proportion of carbohydrates. According to Holt, "when children are fed upon foods lacking in fat the teeth come late, the bones are soft, the muscles flabby," while "children fed upon foods containing too much sugar are frequently very fat, but their flesh is very soft; they walk late and they perspire readily about the head and neck."

Hutchinson divides proprietary foods into three classes:

1. **Foods Prepared from Cows' Milk with Various Additions or Alterations, and Requiring only the Addition of Water to Fit Them for Immediate Use.**—To this class

belong Malted Milk, Nestle's Food, Lactated Food, Carnrick's Food, Cereal Milk, Wyeth's Prepared Food, and Wampole's Milk Food. These foods are prepared from flour baked and mixed with milk or cream and then dried. By means of the malt which is added the starches are converted into dextrin and maltose.

2. **Farinaceous Foods Prepared from Cereals of which the Starch has been Partly or Wholly Converted into Dextrin or Sugar, and which Require the Addition of Milk to Fit Them for Use.**—To this class belong Mellin's Food, Savory & Moore's Infant Food, and Benger's Food. These foods are prepared by mixing equal parts of wheat flour and barley malt with bran and potassium bicarbonate. The mixture is made into a paste with water, and kept at a warm temperature until the starch is converted into dextrin and maltose. As these foods are poor in fat, protein, and mineral matters, they are added to milk in order to render them more nutritious.

3. **Farinaceous Foods in which the Starch has not been Predigested.**—To this class belong Ridge's Food, Neave's Food, Imperial Granum, and Robinson's Patent Barley. These foods are poor in fat, protein, and mineral matters.

Other Proprietary Foods.—Crackers are prepared from flour, water or milk, and are baked into various forms. Baking-powder and soda, and frequently milk, butter, sugar, and flavoring extracts are added. Crackers are, as a rule, easily digested.

Malt Extracts.—Malt extracts are manufactured by heating a solution of malted barley at a moderate temperature *in vacuo*. Malt extracts are especially useful as beverages for those weakened by chronic disease, as tuberculosis or anemia, and in the convalescence from acute diseases, as after typhoid fever or pneumonia.

Among the various malt preparations may be mentioned Maltine, Kepler's Extract of Malt, and Hoff's Malt Extract.

COOKING OF FOODS.

The cooking of food is an art practised by all races, savage as well as civilized. Food is cooked to improve its flavor, to soften it so that it can be masticated and more easily digested, and finally to destroy all parasites and disease germs that may be present in the raw food. By cooking certain flavors are developed, which by their savoriness increase the appetite and the taste for the food. Cooking, moreover, destroys the tough fibrous envelopes that surround many foods, thus permitting the food to be more easily acted upon by the various digestive fluids. Various parasitic organisms present in many foods are destroyed by cooking, and the food thus freed from one of its most dangerous elements. On cooking, the protein in food coagulates; under the influence of dry heat the starches are gradually converted into dextrin; whereas, under the influence of moist heat the granules gradually swell until they rupture their envelopes. Sugars, by boiling, are changed gradually into caramel, which is the source of the odor frequently given off in the cooking of food. When fats are heated they undergo a change, with the production of free fatty acids which are often responsible for the odors that exist in the kitchen.

Cooking of Meat.—Boiling.—In boiling meats the temperature of the water should not exceed the temperature necessary for the coagulation of the proteins. In order that the meat may retain as much of its flavor as possible, it should be immersed in boiling water for a few moments; in this way the protein on the surface immediately coagulates, thus preventing the escape of the con-

stituents and so retaining all the nutritive elements in the meat. After this has been accomplished, the temperature of the water may be lowered and the process of cooking continued. The broth which is so produced is thin and poor. If a rich, nutritious broth is desired, the meat should be cut into small pieces and placed in cold water, and the temperature gradually increased to 150° F. In this way the nutritious elements of the meat pass out into the broth.

Roasting.—In roasting, the meat is first exposed to a high temperature and afterward cooked slowly; thus, the outer layers coagulate at once, preventing escape of the juices. Roasting not only prevents evaporation of the flavors of meats, but by its effect on the extractives develops savory odors and flavors.

Baking.—Baking much resembles roasting, except that by the latter process the heat is applied all around the meat instead of only to one side.

Stewing.—For this purpose meat is cut into small pieces and placed in a small quantity of water. The water is heated slowly, but not allowed to boil; a certain amount of the nutritious substances thus passes into the water, which then becomes rich, and to which flavoring substances and vegetables are added. Inasmuch as the juice is eaten with the meat, none of the nutritious ingredients is lost.

Braising.—In this process the meat is placed in a small vessel and covered with a strong liquor of vegetable and animal juices; it is then heated, but not boiled. The tough fibers of the meat are thus loosened and made tender; the meat also becomes impregnated with vegetables and spices present in the juices, which enhance its flavor.

Broiling.—Broiling and roasting are similar processes,

except that in the former smaller portions are utilized; the process is thus more rapid, a large surface being exposed to the direct action of the heat.

Frying.—In this process the meat is put into boiling fat, with which it becomes saturated; fatty acids are thus produced, which have a tendency to irritate the stomach and cause indigestion.

Cooking of Fish.—Fish may be boiled, broiled, baked, and fried. Boiled fish is most easily digested. Inasmuch as the flavoring substances are more easily dissolved out into the water and lost, less time should be consumed in boiling fish than in boiling meat. Sir Henry Thompson has shown that even with careful boiling 5 per cent. of the solid matter of fish is apt to be lost; for this reason steaming is often preferable.

Effect of Cooking.—The **effect of cooking on meat** is to diminish its watery constituents, thus concentrating and rendering it more nutritious; by this process also the extractives as well as some of the fats are partly removed.

Effect of Cooking on Vegetables.—The important object in the cooking of vegetables is to rupture the cellulose envelope and so to soften the contained starch granules. Under the influence of heat and moisture the starch swells and bursts its envelope, forming a paste; this paste, in its turn, expands and ruptures the cellulose envelope; cooking, therefore, renders vegetable foods more easily digestible.

As has been pointed out, in the cooking of meats a certain proportion of the ingredients is lost. Unlike meats, however, vegetables become more watery in cooking. In this condition they are more easily acted upon by the gastric secretion; on the other hand, the addition of water in cooking so increases their bulk that the motor function of the stomach is apt to be overtaxed.

When food is cooked rapidly there is a tendency to overcook the outer layers and to leave the inner underdone. The better plan, therefore, is to cook food slowly for a longer period of time at a lower temperature. Various appliances are on the market which have for their object the production of a continuous action of a moderate heat at the expense of as little fuel as possible. The "Aladdin Oven" of Dr. Edward Atkinson is an apparatus of this kind.

DISEASES CAUSED BY ERRORS IN DIET AND BY VARIOUS FOOD POISONS.

Disease may be caused by taking too little or too much food, and also by a diet that is not well balanced—that is, does not contain the combination of food elements in the correct proportions—and by other dietetic influences, the precise nature of which is as yet obscure. It may also be caused by certain poisons or disease germs or parasites taken into the body with food and drink.

The diseases due to insufficient food are starvation, malnutrition, marasmus, and some forms of anemia. Chlorosis is liable to occur in underfed girls.

Overeating probably causes as much disease as overdrinking. Among the most striking of these are gout and obesity. Diseases of the skin, kidneys, liver, and other organs may also be due to this cause.

Lack of fresh food may produce scurvy and an improperly balanced diet may cause rickets.

The abuse of various beverages deserves mention. The effects of the abuse of alcohol and the nervousness resulting from the excessive use of tea and coffee are well known.

Acute food-poisoning is usually due to the action of ptomains, and this is called ptomain-poisoning. Pto-

mains or toxins are poisonous substances caused by the action of bacteria, and may be generated in nitrogenous foods or in the alimentary tract. They resemble alkaloids, and when absorbed are partially destroyed by the liver. The symptoms vary, but nausea, vomiting, purging, pain in the abdomen, and collapse are the most frequent. Various names are applied according to the food which causes the trouble, as milk-poisoning (galactotoxismus); cheese-poisoning (tyrotoxismus); mussel-poisoning (mytilotoxismus); fish-poisoning (ichthyotoxismus); meat-poisoning (kreotoxismus). Faultily cured sausage sometimes causes poisoning (botulismus), and epidemics of pneumonia have resulted from eating infected bacon, infected ham, or other spoiled meat. The poison may be present without producing any change in the appearance of the meat.

Other forms of food-poisoning are as follows:

Mushroom-poisoning.—Poisonous fungi are frequently mistaken for edible mushrooms and lead to poisonous symptoms. The active principle in these fungi is called muscarin. If there is a ring about the stalk, the mushroom peels easily and has pink gills, it is said to be non-poisonous. This is not a safe rule, as some of the most poisonous varieties answer to this description.

Grain-poisoning.—There are three forms of grain-poisoning—ergotism, pellagra, and lathyrism. Most cases and epidemics have occurred among the poverty-stricken European peasants.

Ergotism (sitotoxismus) is due to eating spurred rye, from which the drug ergot is obtained. Lathyrism (lupinosis) is caused by eating the chick-pea.

Beriberi.—This is a disease chiefly seen in the Orient, and it is supposed to be due to polished rice. The polishing removes the outer cover, which contains a certain

amount of phosphorous. The rice polishing mixed with milk and sugar is sometimes given as a cure. There are others who believe the disease is due to some parasite.

Pellagra.—In the past few years there has been an enormous increase in the amount of pellagra in the United States. The cause of the disease is not as yet established. Some believe that it is due to a parasite transmitted by a certain two-winged fly, and others that it is due to eating certain foods, particularly maize which has been spoiled.

Actinomycosis or lumpy-jaw, a disease of cattle, is sometimes transmitted to man. In some of the cases the patients were in the habit of chewing raw grain.

Foot-and-mouth disease is another disease of cattle which may be transmitted by the use of milk from cows suffering with it. Such milk should not be used. If the disease is suspected the milk should be boiled.

Hydatid Disease.—Cysts of a peculiar character sometimes occur in man by taking the eggs of a dog tapeworm (Tænia echinococcus) into the body with the food. Green salads are the most frequent source of infection. The disease is almost unknown in America.

Idiosyncrasies.—Curious food idiosyncrasies exist and must be borne in mind. They are more often fancied than real. Urticaria (hives) may be caused in some people by eating crabs, oysters, strawberries, and other articles of food. Gastric pain, vomiting, diarrhea, and other symptoms may be produced by such foods in some persons, while others eat them with impunity.

Parasites.—Certain parasites may be taken in with food or drink. Many of these are rare, and seldom if ever seen in America. Among them may be mentioned the following: **Amœba coli**, taken in with drinking-water, is the cause of one form of dysentery.

Several species of **tapeworm** (Tænia solium in pork, T. mediocanellata in beef, etc.), of which the beef tapeworm is the common variety in the United States, may be met with.

The **pin-worm** (Oxyuris vermicularis) and the **round-worm** (Ascaris lumbricoides), the eggs of which are supposed to be taken in water or raw food. The **hook-worm** (Strongylus duodenale), which causes a severe anemia, is taken in drinking-water. The **trichina** is taken in with raw pork, and the **filaria** is taken in with drinking-water.

Infected Milk.—Certain diseases may sometimes be transmitted by infected milk. Among these are diarrheal diseases, diphtheria, scarlet fever, typhoid fever, and Asiatic cholera. The last two are usually carried by infected water.

FOOD ADULTERATION.

Food adulteration is of two kinds: that which is injurious and that which is non-injurious. The latter is practised where there are no fixed standards, or, where such do exist, in debasements from these fixed standards. Adulterations may be classified as follows:

1. **Conventional**—to suit the taste and demands of the public. Such adulterations are usually effected by means of coloring-matters, many of which are harmful, and by bleaching certain products.

2. **Accidental or incidental**—arising from environment, carelessness, or incompetency on the part of the producer, manufacturer, or his agents. This usually consists in an admixture of some foreign substance, such as husks, stems, leaves, etc.

3. **Arbitrary**—to comply with or take advantage of certain fixed arbitrary standards.

4. **Intentional**—for purposes of gain and competition.

A Table of the Various Adulterations.[1]

Articles.	Deleterious adulterants.	Fraudulent adulterants.	Accidental adulterants.
Arrowroot.		Other starches which are substituted in whole or in part for the genuine article.	
Brandy.		Water, burnt sugar.	
Bread.	Sulphate of alum.	Flours other than wheat, inferior flour, potatoes.	Ashes from oven, grit from mill-stones.
Butter.	Copper.	Water, other fats, excess of salts, starch.	Curd.
Canned vegetables and meat.	Salts of copper, lead.	Excess of water.	Meat damaged in the process of canning.
Cheese.	Salts of mercury in the rind.	Oleomargarin.	
Candy and confectionery.	Poisonous colors, artificial essences.	Grape-sugar.	Flour.
Coffee.		Chicory, peas, rye, beans, acorns, chebus-nuts, almond or other nut-shells, burnt sugar, low-grade coffees.	
Cocoa and chocolate.	Oxid of iron and other coloring-matters.	Animal fats, starch, flour, and sugar.	
Cayenne pepper.	Red lead.	Ground rice-flour, salt, ship-bread, Indian meal.	Oxid of iron.
Flour.	Alum.	Ground rice.	Grit and sand.
Ginger.		Turmeric, Cayenne pepper, mustard, inferior varieties of ginger.	
Gin.	Alum salt, spirit of turpentine.	Water, sugar.	
Honey.		Glucose, cane-sugar.	Pollen of various plants and insects.
Isinglass.		Gelatin.	
Lard.	Caustic lime, alum.	Starch, stearin, salt.	
Mustard.	Chromate of lead, sulphate of lime.	Yellow lakes, flour, turmeric, Cayenne pepper.	
Milk.	Water.	Burnt sugar, annatto.	Sand, dirt.
Meat.	Infested with parasites.		Tainted.
Horseradish.		Turnip.	
Fruit-jellies.	Anilin colors, artificial essences.	Gelatin, apple-jelly.	
Oatmeal.			Old and wormy.
Pickles.	Salts of copper, alum.		
Preserves.	Anilin colors.	Apples, pumpkins, molasses.	
Pepper.		Flour, ship-bread, linseed meal.	Sand.
Sago.		Potato-starch.	
Rum.	Cayenne pepper, artificial essences.	Water.	Burnt sugar.
Sugar.	Salts of tin and lead, gypsum.	Rice-flour.	Sand and dirt, insects dead and alive.

[1] From *Bulletin No. 25*, Division of Chemistry, United States Department of Agriculture.

Articles.	Deleterious adulterants.	Fraudulent adulterants.	Accidental adulterants.
Spices. Cloves. Cinnamon. Pimento.		Flour, starches. Arrowroot. Spent bark. Ship-bread.	
Tea.		Foreign leaves, spent tea, plumbago, gum, indigo, Prussian blue, China clay, soapstone, gypsum.	Ferruginous earth.
Vinegar.	Sulphuric, hydrochloric and pyroligneous acids.		
Wine.	Anilin colors, crude brandy.	Water.	Sulphate of potassium.

Wood alcohol is sometimes used to adulterate alcoholic beverages, flavoring extracts or drugs. It may cause blindness or death.

Lead and copper or white salts may occasionally find their way into canned food. This may be used intentionally. Lead may come from solder dropped in the can or from using dull tin (terne or roofing-tin) for the cans. Only the bright tin should be permitted.

Preservatives.—Various chemicals are mixed with foods to preserve them. In some countries the use of preservatives is forbidden. Borax, boric acid, salicylic acid, sulphate or bisulphate of sodium are the most frequent. They are all injurious, and if taken into the body continuously produce disturbances of digestion, lower the nutrition, and may cause disease of the kidneys. Formaldehyd is frequently used, and in general it may be stated that its use is undesirable and dangerous.

Simple Tests for the Detection of Preservatives.—The following tests, largely adopted from Bigelow and Howard's article, will be found of use in detecting the more important commercial preservatives, with the exception of sulphites and fluorids. The sulphites are

used in meats and the fluorids in fruits, and the methods for determining their presence are not suited for household use. All of these tests require considerable experience in order to draw correct conclusions.

Salicylic Acid.—This is very commonly used in all kinds of foods, solids and liquids, especially fruit products. It is best detected in solution, and solids and semisolids should be macerated in water, and then strained through a white cotton cloth. Two or three ounces of the fluid to be tested is used, adding to it a few drops of sulphuric acid (or about 15 grains, the quarter of a teaspoonful, of cream of tartar). Shake thoroughly and filter. To the clear liquid add three or four tablespoonfuls of chloroform, mix by a rotary motion, but do not shake, or an emulsion will be formed which is difficult to break up. Allow the chloroform to settle, and remove as much as possible by means of a pipette or medicine-dropper. This is placed in a test-tube, with an equal amount of water and a small piece—a little larger than a pin-head—of iron alum. Shake well and allow to settle, and if salicylic acid is present, the upper layer will have a purple color.

Benzoic Acid.—This is used chiefly in fruit products, catsup, etc. This test is not sufficiently delicate for very small quantities, such as may be added to wine. Proceed as above. Evaporate the chloroform by placing in a saucer outside of a closed window. In cold weather place the saucer in a basin of rather warm water. When the chloroform has evaporated the characteristic flat crystals of benzoic acid may be seen in the saucer, and on warming the characteristic irritating odor of the acid can be detected.

Borax and Boric Acid.—Both of these are used in

many food products. Macerate solids or semisolids as above, cool the liquid, and filter through filter-paper.

In testing butter place a heaping teaspoonful in a cup, add a couple of teaspoonfuls of hot water, stand the cup in hot water until the butter is melted, stir well, then put the cup in cold water until the butter solidifies, and then filter the liquid.

For milk use an ounce of milk and two ounces of a solution of a teaspoonful of alum to a pint of water. Shake well and filter. Add five drops of hydrochloric acid to a teaspoonful of the liquid, dip a piece of turmeric paper in it, and dry the paper. If either borax or boric acid is present, the paper, when dry, becomes a sherry red. A drop of ammonia turns the color dark green or greenish black. If too much acid has been used, the color may first be brown, even if borax or boric acid is present. The ammonia turns this brown, just as it will turn turmeric paper which has not been dipped in acid solutions.

Saccharin.—Proceed as in the test for salicylic acid. The residue left on evaporating the chloroferm has the sweet taste of saccharin. Sugar is not soluble in chloroform, so will not be present. If tannins are present the astringent taste may mask the taste of the saccharin.

Formaldehyd.—This must be separated by distillation in foods other than milk. Formaldehyd is best tested by using either Hehner's or Leach's test. They are based on the appearance of a violet color when concentrated sulphuric acid or hydrochloric acid containing a trace of iron is added to the milk.

Hehner's Test.—To a few cubic centimeters of concentrated sulphuric acid, to which a trace of some ferric salt has been added, add the milk to be tested, so as to form a distinct layer on top of the acid, and allow to

8

stand. If formaldehyd be present, even one part to a million of milk, a violet coloration will take place at the junction of the two liquids.

Leach's Method.—Dilute the milk with an equal volume of water, and add for each cubic centimeter of the diluted milk 1 cc. of concentrated hydrochloric acid containing 1 cc. of 10 per cent. ferric chlorid solution, to each 500 cc. of acid. The mixture is heated in a casserole over the bare flame to 80° or 90° C., rotating to break the curd which forms. If formaldehyd be present, a violet color will appear.

Hydrogen Peroxid.—This may be detected in milk by the use of a solution of titannic acid (titannium hydrate) dissolved in sulphuric acid. This is added to a few cubic centimeters of milk, and if the peroxid is present, coloration appears, but varies between a light yellow and a deep orange, according to the amount of peroxid present. A somewhat similar reaction takes place from milk containing salicylic acid.

The Determination of Artificial Colors.—**The Coal-tar Dyes.**—If the substance to be examined is not a liquid, dissolve the dye by macerating it in water. Filter, take two or three ounces and add a few drops of hydrochloric acid, and a few strands of white woolen yarn, or pieces of white woolen cloth. (Before using, the wool should be boiled in water containing a little soda to remove any fat it may contain, and then washed in water.) The wool, which has been boiled, is washed first in hot and then in cold water, and the water pressed out. If the wool is not discolored, the substance tested may be regarded free from artificial colors. If the wool is colored, it may be from coal-tar colors, some foreign vegetable colors, or, if a fruit is being examined, the

natural coloring-matter of the fruit. Rinse the wool in hot water, and boil three minutes in two ounces of water, to which two drams of ammonia have been added. Squeeze out the excess of water. Natural fruit color is retained, while the coal-tar dyes are usually dissolved in the ammonia solution. Add hydrochloric acid to this fluid until the odor of the ammonia has disappeared and the liquid has a sour taste. A fresh piece of woolen yarn is boiled in this, and if it is colored, the substance examined has been artifically colored. Dull, faint tints must be disregarded. If an anilin dye (coal-tar) has been used, the yarn will usually be turned purple or blue by ammonia.

The Detection of Copper.—This is often used in coloring canned peas, beans, etc. Mash the substance to be examined and add a teaspoonful of the pulp to three teaspoonfuls of water and thirty drops of hydrochloric acid. Place the cup in which this has been placed in a water-bath (saucepan containing water will do) and add a bright iron wire nail. Boil hard twenty minutes, stirring frequently with a splinter of wood or a glass rod. If copper is present in any appreciable amount the nail will be plated with copper.

Turmeric.—This is added to yellow spices, especially mustard and mace. Mix one-half teaspoonful of the substance to be examined in a white china dish with an equal amount of water, and five or ten drops of ammonia. If turmeric is present, a brown color is formed. If an insufficient amount of the dye has been used to give this test, a more delicate one is to mix a teaspoonful of the substance to be examined with an ounce of alcohol, and then allow it to settle fifteen or twenty minutes. About one-half ounce of the upper liquid is placed in a dish with five drops of concentrated solution of boric acid or

borax, and ten drops of hydrochloric acid, and the solution thoroughly mixed. A wedge-shaped strip of filter-paper, two or three inches long, an inch wide at the upper end, and one-quarter inch at the lower end, is then suspended so that the lower end touches in the solution. The paper should not touch the side of the dish. This should be allowed to stand for a couple of hours, and if turmeric is present, a cherry-red color forms on the filter-paper near the upper edge. This red color is turned dark green or almost black on the addition of ammonia. If too much hydrochloric acid has been added, a brownish color results.

Caramel.—This is used to color vinegar and other fluids. It should be borne in mind that caramel occurs naturally in malt vinegar. Place about one ounce of the fluid to be tested in two test-tubes, add a teaspoonful of fuller's earth to one, and shake vigorously two or three minutes. Filter through filter-paper. The first part of the liquid coming through the paper should be returned to be filtered a second time. If the filtered liquid, on comparison with the untreated test-tube, is markedly lighter in color, one may assume that the color of the liquid is due to caramel, which is largely removed by the fuller's earth. This test requires a certain amount of practical experience before results can be depended upon.

Coffee.—The difference between ground coffee and that which has been adulterated can often be told by the naked eye, especially if not very finely ground. Pure coffee has a uniform appearance, with dull surfaces, while most of the substitutes, particularly peas and beans, have polished surfaces. Chicory is very dark and gummy looking, and the particles have a distinctly astringent taste. On placing ground coffee in a bottle half full of water, shaking it and allowing it to stand, a large amount

of the coffee will float, while most of the substitutes sink at once to the bottom. The chicory particles will color water, and as they sink slowly to the bottom leave a little dark train behind them. Coffee contains no starch, while all of the substances, except chicory, used for adulteration contain a considerable amount. All ground coffee that gives a starch reaction may be considered as adulterated.

Flavoring Extracts.—Vanilla and lemon are the most commonly used and most adulterated. They are frequently made with the extract of the tonka bean, which can be determined by the peculiar odor by any one familiar with the two products. The extract made from the artificial vanillin lacks the resins. Caramel is often added to color it, and may be detected by shaking; the foam of pure extracts is colorless, and if caramel is present, little points of color will be seen at the point of contact with the bubbles. The fuller's earth test, given above, may also be used. To examine for the presence of resins, the extract should be evaporated, and when it reaches one-third its volume the resins become insoluble and settle to the bottom, while artificial extracts remain clear. If water is now added, the resin will separate out in a brown precipitate. A few drops of hydrochloric acid should be added, the liquid stirred and then filtered; the resin left on the filter-paper should be washed with water, and then dissolved in a little alcohol, and to one part of this add a few drops of hydrochloric acid, and to another a small particle of ferric alum. The resin from the vanilla bean has only a slight change of color, while with most other resins one or both of these reagents yield a distinct color change.

Lemon extract may be tested by placing a teaspoonful of the oil in a test-tube, and adding two or three tea-

spoonfuls of water. With real lemon extract the fluid first becomes turbid, and later the oil of lemon separates on the top of the water. If it remains perfectly clear, it is a low-grade product, and contains very little, if any, oil of lemon.

Spices.—The detection of adulteration in spices for the most part requires expert knowledge of chemistry and microscopy. Most of the substances used contain starch, but so do most of the common spices. Cloves, mustard, and cheyenne pepper are practically free from starch, and the presence of it may be taken as a proof of adulteration. To test for starch, one-half teaspoonful of the suspected spice should be stirred into one-half cup of boiling water, and boiled for several minutes and then cooled. If the fluid is of very dark color, it should have water added to it, and to this a single drop of iodin is added. If starch is present, it gives the characteristic deep blue color, and if very much is present, it turns black. If no blue color appears, the iodin should be added drop by drop until it shows in the solution.

Vinegar.—The simplest test is the odor. If it is not apparent the glass should be rinsed out with the vinegar, and allowed to stand for some hours, when the odor of the residue will be quite distinct; cider vinegar having the fruit odor, and wine vinegar the odor of wine. The residue may also be obtained by evaporation. If the vinegar has been colored, the caramel can be tested by the fuller's earth test. It should be borne in mind that many of the vinegars made from spirits and wood have apple-jelly added to give them the characteristic odor.

The Halphen Reaction for Cottonseed Oil.—Carbondisulphid, containing about 1 per cent. of sulphur in solution, is mixed with an equal volume of amyl alcohol.

Equal volumes of this reagent of the oil to be examined are mixed and heated in a bath of boiling brine for fifteen minutes. In the presence of as little as 1 per cent. of cottonseed oil, an orange or red color is produced, which is characteristic. Lard and lard oil, from animals fed on cottonseed meal, would give a faint reaction.

Renovated butter and oleomargarin may be distinguished from ordinary butter by boiling a small amount in a small pan or tablespoon. It should be melted slowly, and stirred with a wooden splinter or match stick several times during the boiling. Genuine butter boils with little noise, and produces an abundance of foam, while renovated butter and oleomargarin boil noisily, sputter like a mixture of grease and water, and produce less foam.

Oleomargarin may also be distinguished from butter and renovated butter by the Waterhouse test.

Sweet skimmed milk is used, filling a half-pint cup half full, then heat this nearly to boiling, and add a slightly rounded teaspoonful of the material to be tested. Stir with a wooden rod, and continue heating until the milk boils up; then remove from the heat and cool in a pan containing rather large fragments of ice and a little water. When the cup is placed in the pan the water should reach on the outside of the cup to one-quarter of the height of the milk within. The contents of the cup should be stirred rather rapidly and continuously, and about once a minute the cup should be moved about in the ice so as to facilitate cooling. If the sample is oleomargarin, the fat gathers into one soft lump, and if it is butter, the fat becomes granulated and cannot be collected. When the test is properly carried out the distinction is very marked.

CHAPTER IV.

THE FEEDING OF INFANTS AND CHILDREN.

THERE are four methods of feeding infants: (*a*) Breast- or maternal feeding. (*b*) Wet-nursing. (*c*) Mixed feeding—*i. e.*, breast-feeding supplemented by bottle-feeding. (*d*) Bottle- or artificial feeding.

(*a*) **Breast-feeding.**—This is the natural and best way to feed a baby, and every mother, if she is capable, should be instructed about nursing her infant. The mental attitude of the mother has much to do with the secretion of milk, and the nurse should never discuss the mother's probable incompetency with her. All conversation should be hopeful and encouraging. If the baby is not gaining properly, tell the physician and not the mother.

During the later months of pregnancy the breasts should be examined, and if the nipples are short they should be gradually lengthened by gentle traction several times a day. If they are inverted, a breast-pump may be needed to draw them out at first. During the entire nursing-period the breasts should be washed after each nursing, preferably with a boric acid solution. This does much toward preventing ulcers, fissures, and inflammations.

During the first forty-eight hours the child receives practically no nourishment from the breast, the only fluid secreted during this time being a yellowish creamy substance known as colostrum. This has a laxative effect upon the child's bowels. The child should,

however, be put to the breast at regular intervals to stimulate the secretion of milk, which becomes free on the beginning of the third day, although it may be delayed a day or two longer. During the first two days the nursing child does not require anything except what it gets from the breast. It may, however, be given a teaspoonful or two of warm boiled water or of a 5 per cent. solution of milk-sugar. If the free flow of milk is delayed beyond forty-eight hours the child must be given nourishment, but should nevertheless be put to the breast at regular intervals, to help establish the milk secretion. Neglect of this important point often causes a failure in the secretion.

If necessary the mother may be instructed as to the manner in which to give the child the breast. The child should lie on the right or left arm, according to whether the child is nursed at the right or left breast. If the mother is in a sitting posture her body should be inclined slightly forward. With her free hand she should grasp the breast near the nipple, between the first two fingers. If, owing to the too free flow of milk, the child takes the milk too rapidly, this may be checked by slight pressure of the fingers. The child should nurse until satisfied. The contents of one breast are generally sufficient for one nursing, and the breasts should be used alternately. When satisfied the child will usually fall asleep at the breast. Under ordinary conditions nursing should last from about ten to twenty minutes. If the milk is taken too rapidly, vomiting may ensue during or immediately after feeding. If too much is taken, it is regurgitated almost immediately. If the infant consumes more than half an hour in nursing, the breast and the milk should be examined. As the infant grows it

requires and takes more food, and consequently nurses somewhat longer than in its earlier days.

Good nursing habits should be insisted upon, as many attacks of indigestion, colic, and diarrhea may be traced to improper nursing. When good habits are established there is generally but very little trouble, the success of the training depending largely upon how it is done. Regular hours for feeding should be fixed and adhered to; if the child is asleep at the nursing hour it may be aroused, for it will almost invariably go to sleep after nursing. After the last feeding, which should be at 9 or 10 o'clock, the child should be quieted and allowed to sleep as long as it chooses. During the first month or two the infant will, as a rule, awaken between 1 or 2 o'clock and again at 4 or 5 o'clock. After two or three months it will require but one night feeding, and after five months of age the average infant will sleep all night without nursing.

When the change is being made and the child awakens for its accustomed nursing, it should be given a little warm water from a bottle and quieted but not taken up.

The following table from Holt may be used as a guide in breast-feeding:

Age.	Number in twenty-four hours.	Intervals during the day.	Night nursing between 9 P. M. and 7 A. M.
1st day	4	6	1
2d day	6	4	1
3d to 28th day	10	2	2
4th to 13th week	8	2½	1
3d to 5th month	7	3	1
5th to 12th month	6	3	0

If the child is small or ill it will run somewhat behind the above schedule, and if it is large and robust some-

what ahead of it. It is a good general rule to feed the child according to the age to which the child's weight corresponds. The child's weight is the best index to its nutrition. During the first few months it should be weighed twice a week, then once a week, and during the second six months twice a month.

If the mother's milk is unsuited to the child it is fretful, the weight remains stationary or the child loses, and there may be bowel disturbances. In such cases the physician frequently examines the breast-milk to determine its quality, and he may either decide to wean the child or to take certain measures to improve the breast-milk. The following are the most frequent means of modifying the mother's milk:

1. If the milk is too rich the diet should be limited, especially as to the amount of meat taken. All alcoholic and malted drinks should be prohibited. With plenty of fresh air and exercise, such as walking, the desired effect will generally be brought about. The exercise should be carried to the point of fatigue.

2. When the milk is good but deficient in quantity, the supply may be increased by massage of the breasts three times a day and from five to ten minutes. A good malt extract should be given with the meals, plenty of milk should be given, and exercise and fresh air looked after.

3. When the milk is deficient both in quality and quantity the above means should be used, and the physician generally prescribes iron in addition, and special orders about the diet.

4. When the quantity is normal but the quality poor the same means should be tried, but these cases are practically hopeless, and the physician usually decides to wean the child.

Contra-indications to Maternal Nursing.—While it is desirable that the mother should nurse her child if possible, certain things do not permit it in the best interests of both mother and child. It is strictly the physician's province to decide this question, but it is well for the nurse to know that the following are the contra-indications: 1. If the mother has tuberculosis in any form. 2. If the mother has had any serious complications, either with pregnancy or parturition, nephritis, convulsions, hemorrhage or infection. 3. If the mother has chorea or epilepsy. 4. If the mother has shown in two previous pregnancies that she is totally unable to nourish her child. 5. When no milk is secreted nursing is impossible, but bear in mind that the milk-supply may be deficient because no care is taken to establish it.

FIG. 3.—A hygienic nursing bottle (De Lee).

(*b*) **Wet-Nursing.**—With the advent of better methods of artificial nursing the wet-nurse is disappearing, at least in the United States. Some infants will not thrive on any but human milk, and sometimes wet-nurses are still employed. Their choice should always be supervised by a physician.

(*c*) **Mixed Feeding.**—The physician may decide to give the child one or more bottles a day, while the milk is being established, if it is delayed beyond forty-eight hours, during illness of the mother, during weaning, and often one bottle a day is allowed to permit the

mother to attend to necessary household or social duties.

(*d*) **Artificial Feeding.**—When it becomes necessary for the child to be fed on the bottle, the milk-mixture to be used should be prescribed by the physician, and the nurse instructed by him in its preparation. It happens very often that many details are left to the nurse, and frequently even the entire matter. The following short account will help her understand what is expected. (Full details will be found in our larger book, "Diet in Health and Disease.")

The average infant will not thrive on plain cows' milk. To render it more fit for digestion it is diluted with water, lime-water, cereal gruels, and other articles of diet. The necessity for this will be seen on considering the differences between cows' and mother's milk.

Proteins.—These differ in amount and character. Mother's milk contains 1.5 to 2 per cent. of protein, on an average. Of this two-thirds are lactalbumin and one-third casein, the latter being much more digestible than the former. In cows' milk there is about 3.5 per cent. protein, of which five-sixths are casein and one-sixth lactalbumin. The casein of mother's milk is coagulated in the stomach in small flocculent masses. Cows' milk is coagulated in large curds. The proteins of cows' milk may be prevented from forming large curds by the addition of lime-water, barley-water, and gruels.

Sugar.—Milk-sugar is present in mother's milk in a very constant proportion of 6 to 7 per cent. In cows' milk it averages 4.5 per cent. Milk-sugar must be added to the milk to bring up the amount, or sometimes cane-sugar is added. Owing to its excessive sweetness, cane-sugar is used in just half the quantity of milk-sugar.

Fat.—The fat in human milk averages 4 per cent.; that of cows' milk is the same. When the cows' milk has been diluted, the quantity of fat must be made up by adding cream or using the upper part of the milk after the cream has risen, as explained below in the "Top-Milk Method."

Salts.—The inorganic salts in the milks vary in about the same proportion as the proteins. They need not be considered in modifying milk for babies.

Reaction.—Mother's milk is always alkaline, while cows' milk is acid or neutral. This acidity must be corrected by adding 5 per cent. of lime-water. If the milk is to be sterilized at boiling-point, the lime-water should be added afterward, or else sodium bicarbonate added in the proportion of 1 grain to the ounce. Coit uses potassium bicarbonate.

The Caloric Needs of Infants.—The total caloric needs of infants has not been definitely determined, and they vary greatly under different conditions. An infant that sleeps a great deal will require less food than one who is very wakeful, and the high-strung, nervous, and very active child requires considerably more than others. Children require more per kilo, or per pound of weight, than grown people, partly because they need a certain amount for growth and partly owing to the fact that the proportion of surface is greater in the small body. Atrophic children and those under weight for their age require more than the normal child, and the needs of premature children are much larger than ordinarily would be expected. The requirements the first three months are about 100 calories per kilo (45.4 calories per pound), during the second three months between 90 (40.9 calories

per pound), and during the latter part of the first year 80 calories per pound (36.4 calories per pound). Artificially fed children apparently need more than those fed at the breast. Premature infants require from 100 to 132 calories per kilo. If the percentage composition of the infant's food is known, the number of calories they contain may be approximately estimated by Fraley's method, which consists in adding together twice the fat percentage, the protein percentage, and the sugar percentage, and multiplying this sum by one and a quarter times the total quantity expressed in ounces. This may be expressed in the following formula:

$$2F + P + S \times 1\tfrac{1}{4}\,Q = \text{Calories.}$$

MILK MODIFICATION.

There are a number of methods of modifying milk for infants, if it is necessary to do more than to make a milk approximate in character that of human milk. A young and feeble child requires small percentages of all ingredients, which may be increased gradually as the child's digestive powers increase. Rotch gives a table (p. 102) based on the experience of the Walker-Gordon Laboratory.

Where the proteins are split, the result is obtained by using mixtures of whey and cream or milk. The whey is obtained by coagulating the casein with rennin or essence of pepsin (Fairchild's).

Laboratory Method.—In certain cities there are milk laboratories, known as the Walker-Gordon laboratories, where physicians may send prescriptions for milk-mixtures, which are made at the laboratory and sent to

the home of the infant. The only procedure is to remove the cotton stopper from the bottle and replace it with a nipple and warm the milk. The Walker-Gordon Company also supply an ideally clean milk for infants' use.

Theoretic Basis for Feeding a Healthy Infant.—Rotch.

Age.	Fat.	Sugar.	Proteins.	Proteins if split.		Amount at each feeding in oz.	Interval between feeding in hrs.	Number of feedings in 24 hrs.
				Whey proteins.	Casein.			
Premature . . .	1.00	4.00	0.25	0.25	0.25	⅛–¾	1–1½	24–18
	1.50	4.50	0.25	0.50	0.25			
At term	2.00	5.00	0.50	0.50	0.25	1	2	10
End of 2d week .	2.50	5.50	0.50	0.50	0.25	1½	2	10
End of 3d week .	3.00	6.00	0.75	0.75	0.25	2	2	9
End of 4th week .	5.50	6.50	1.00	0.75	0.50	2½	2	8
End of 6th week .	4.00	7.00	1.00	0.90	0.60	3	2½	7
End of 8th week .	4.00	7.00	1.25	0.90	0.75	3½	2½	7
End of 12th week	4.00	7.00	1.50	0.90	1.00	4	2½	6
End of 4th month	4.00	7.00	1.50	0.75	1.25	4½	2½	6
End of 5th month	4.00	7.00	1.75	. .	. .	5½	3	6
End of 6th month	4.00	7.00	2.00	. .	. .	6	3	6
End of 8th month	4.00	7.00	2.50	. .	. .	7	3	6
End of 9th month	4.00	7.00	3.00	. .	. .	8	3	6
End of 10th month	4.00	6.00	3.00	. .	. .	8	3	6
End of 11th month	4.00	5.00	3.00	. .	. .	10	3	5
End of 12th month	4.00	4.75	3.50	. .	. .	10	3	5

Top-milk Method.—One of the most frequently used methods is that of Holt, known as the top-milk method. The milk is received in bottles and allowed to stand until the cream has separated. The mixtures are made up by using either the upper third, upper half, or the whole milk. To remove the top milk, the first ounce is taken off with a spoon and the remainder taken out with a Chapin milk-dipper, poured off, or a siphon used to remove the milk from underneath it. Lime-water, sugar, and the required quantity of water are added. The following formulas are taken from Holt's book:

FIRST SERIES OF FORMULAS—FAT TO PROTEIDS, 3 : 1.

Primary Formula.—Ten per cent. milk—fat, 10 per cent.; sugar, 4.3 per cent.; proteids, 3.3 per cent. Obtained—(1) as upper one-third of bottled milk or (2) equal parts of milk and 16 per cent. cream.

Derived formulas, giving quantities for 20-ounce mixtures:

			Fat, per cent.	Sugar, per cent.	Proteids, per ct.
1.	Milk-sugar . 1 oz. Lime-water . 1 oz. Water, q.s. ad. 20 oz.	with 2 oz. 10 p.c. milk .	1.00	5.50	0.33
2.	" " "	" 3 oz. " "	1.50	5.50	0.50
3.	" " "	" 4 oz. " "	2.00	6.00	0.66
4.	" " "	" 5 oz. " "	2.50	6.00	0.83
5.	" " "	" 6 oz. " "	3.00	6.00	1.00
6.	" " "	" 7 oz. " "	3.50	6.50	1.16

Table Giving in a Condensed Form the Quantities Usually Required for Obtaining the Different Fat-percentages.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
To obtain fat, per cent. . .	0.50	1.0	1.5	2.0	2.0	2.5	2.5	2.75	3.0	3.0	3.0	3.25	3.5	3.7	4.0
For total food, ounces . . .	0.20	20.0	20.0	20.0	25.0	28.0	28.0	28.00	30.0	33.0	36.0	36.00	37.0	38.0	40.0
Take 10 per ct. milk, ounces	0.10	2.0	2.0	4.0	5.0	7.0	8.0	8.00	9.0	10.0	11.0	11.00	13.0	14.0	16.0

Proteids: The percentage in each case will be one-third fat.

Sugar: 1 ounce in 20, or 1 tablespoonful in 8 ounces, gives 5.5 per cent. for the lower and 6.5 for the higher formulas.

Lime-water: 1 part to 20 of the food, the average required.

Water: Sufficient to be added to the foregoing ingredients to bring the total to the number of ounces specified; in part of this water the milk-sugar is dissolved. Barley-water or any other diluent may be added in the same manner.

SECOND SERIES OF FORMULAS—FAT TO PROTEIDS, 2 : 1.

Primary Formula.—Seven per cent. milk—fat, 7 per cent.; sugar, 4.4 per cent.; proteids, 3.5 per cent. Obtained—(1) as upper one-half of bottled milk, or (2) by using 3 parts of milk and 1 part 16 per cent. cream.

Derived Formulas, giving quantities for 20-ounce mixtures:

				Fat, per cent.	Sugar, per cent.	Proteids, per ct.
1.	Milk-sugar . 1 oz. Lime-water . 1 oz. Water, q.s. ad. 20 oz.	with	3 oz. 7 p.c. milk .	1.00	5.50	0.50
2.	" " "	"	4 oz. " "	1.40	5.75	0.70
3.	" " "	"	5 oz. " "	1.75	6.00	0.87
4.	" " "	"	6 oz. " "	2.10	6.00	1.05
5.	" " "	"	7 oz. " "	2.50	6.50	1.25
6.	" " "	"	8 oz. " "	2.80	6.50	1.40
7.	" " "	"	9 oz. " "	3.15	7.00	1.55
8.	" " "	"	10 oz. " "	3.50	7.00	1.75
9.	Milk-sugar . ¾ oz. Lime-water . 1 oz. Water, q.s, ad. 20 oz.	"	12 oz. " "	4.00	7.00	2.00

Table Giving in a Condensed Form the Quantities Usually Required for Obtaining the Different Fat-percentages.

	A	B	C	D	E	F	G	H	I	J	K	L	M
To obtain fat per cent.	1.0	1.0	1.4	1.8	2.0	2.33	2.75	2.75	3.1	3.5	3.5	4.0	4.0
For total food, ounces	20.0	30.0	30.0	33.0	33.0	36.00	36.00	40.00	40.0	40.0	44.0	44.0	48.0
Take 7 per ct. milk, ounces	3.0	4.0	6 0	8.0	10.0	12.00	14.00	16.00	18.0	20.0	22.0	25.0	28.0

To obtain the exact fat-percentage, take one-third the number of ounces of top-milk in a 20-ounce mixture and add 0.15 to the result. In practice this slight error may be disregarded.

Proteids : The percentage in each case will equal one-half of the fat.

Sugar : 1 ounce in 20, or 1 even tablespoonful in 8 ounces, until the food becomes half milk; after that 1 ounce in 25, or 1 even tablespoonful to each 10 ounces of the food, will give the proper amount.

Lime-water : Usually in the proportion of 1 part to 20 of the total food.

Water or other diluent : Sufficient to be added to the foregoing ingredients to make the total number of ounces specified; in part of this the sugar is dissolved.

Third Series of Formulas—Fat to Proteids, 8 : 7.

Primary Formula.—Plain milk—fat, 5 per cent.; sugar, 4.5 per cent.; proteids, 3.5 per cent.

Derived formulas, giving quantities for 20-ounce mixtures:

	Ingredients				Fat, per cent.	Sugar, per cent.	Proteids, per ct.
1.	Milk-sugar . 1 oz. Lime-water . 1 oz. Water, q.s. ad. 20 oz.	with	5 oz.	plain milk .	1.00	6.00	0.87
2.	" " "	"	6 oz.	" "	1.20	6.00	1.00
3.	" " "	"	8 oz.	" "	1.60	6.50	1.40
4.	" " "	"	10 oz.	" "	2.00	7.00	1.75
5.	Milk-sugar . ½ oz. Lime-water . ½ oz. Water, q.s. ad. 20 oz.	"	12 oz.	" "	2.40	5.00	2.10
6.	" " "	"	14 oz.	" "	2.80	5.50	2.50
7.	" " "	"	16 oz.	" "	3.20	5.50	2.80

Table Giving Quantities of 16 per cent. Milk Required for Obtaining Formulas with High Fat and Low Proteids.

	A	B	C	D	E	F	G	H	I	J	K
To obtain fat, per cent.	1.6	1.6	2.0	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.0
For total food, ounces	20.0	30.0	30.0	32.0	32.0	37.0	42.0	36.0	40.0	40.0	44.0
Take 16 per cent. milk, ounces	2.0	3.0	4.0	5.0	6.0	7.0	8.0	8.0	9.0	10.0	11.0

Proteids in all cases will be one-fifth the fat.

Sugar: 1 even tablespoonful for each 8 ounces will give 5.5 per cent. for the lower formulas (A, B, C, etc.) and 6 per cent. for the higher formulas (G, H, I, etc.).

Lime-water: 1 ounce to 20 ounces of the food will give 5 per cent.

Materna Graduate Method.—Where a nurse is thrown on her own responsibility, the Estraus Materna Graduate is of great service. With it six modifications can be made, which are sufficient for the average child. Sometimes, of course, a child will be found whose digestive powers do not correspond with the few formulas furnished.

The apparatus consists of a glass jar with a lip and seven panels, and a capacity of 16 ounces. One of the panels exhibits an ordinary ounce graduation; the other six panels present six different formulas for the modification of cows' milk, each formula being so arranged as to keep pace with the infant's growth, viz.:

FORMULA:

Fat . .	2 per ct.	2½ per cent.	3 per cent.	3½ per cent.	4 per cent.	3½ per ct.
Sugar .	6 "	6 "	6 "	7 "	7 "	3½ "
Protein	0.6 "	0.8 "	1 "	1½ "	2 "	2½ "

For Formula 6 see special instructions below.

	3d to 14th day.	2d to 6th week.	6th to 11th week.	11th week to 5th month.	5th to 9th month.		9th to 12th month.
Milk . . . . . parts	1¼	1⅝	2	4½	6	Milk . . . . . parts	9¾
Cream . . . . "	1¼	1⅝	2	2	2	Cream . . . . "	1
Lime-water . . "	1	1	¾	¾	¾	Barley-gruel . "	5¼
Water . . . . "	12½	11¾	11¼	8¾	7½	Granulated sugar, parts	¼
Milk-sugar . . "	1	1	1	1	1¼		

FIG. 4.—The "Materna" graduate (De Lee).

Having decided which formula is to be used, the panel containing that formula is the only one to be followed.

The quantity desired for twenty-four hours is next to be considered, and the apparatus filled—once, if 16 ounces or less are required for the twenty-four hours; twice, if from 16 to 32 ounces are required for the twenty-four hours; three times, if from 32 to 48 ounces are required for the twenty-four hours.

Baner's Method.—If the percentages have been given, the quantities of milk, cream, sugar and water needed may be determined by the following formulas:

Quantity desired (in ounces)	$= Q.$
Desired percentage of fat	$= F.$
Desired percentage of sugar	$= S.$
Desired percentage of protein	$= P.$

To find in ounces:

Cream (16 per cent.)	$= \frac{Q}{12} \times (F - P).$
Milk	$= \frac{Q \times P}{4} - C.$
Water	$= Q - (C + M).$
Dry milk-sugar	$= \frac{S - P \times Q}{100}.$

Example.—Suppose it is desired to make 40 ounces of a 4 per cent. fat, 7 per cent. sugar, 2 per cent. protein mixture. By substituting the figures in the equations above we have—

Cream	$= \frac{40}{12} \times 2 = 6\frac{2}{3}$ ounces.
Milk	$= \frac{40 \times 2}{4} - 6\frac{2}{3} = 13\frac{1}{3}$ ounces.
Water	$= 40 - 20 = 20$ ounces.
Sugar	$= \frac{5 \times 40}{100} = 2$ ounces.

Malted gruels, various diastase preparations, such as diastoid, maltine and diazyme, as well as the malted foods, such as Mellin's, are sometimes used to prepare the infant's milk, especially if there is constipation. Bar-

ley-, oatmeal-, and rice-water are sometimes used to dilute the milk to break up the curd. Barley- or rice-water is preferred when there is a tendency to loose bowels, and oatmeal-water when there is constipation. Cereal gruels are probably best not begun before the eighth or ninth month, unless there be some special indication for so doing.

Other Foods for Infants.—Many other foods may be of service under certain conditions. The following are the most important:

Condensed Milk.—This is most useful in many cases, for temporary use, particularly in difficult cases that have been improperly fed on too high fat and protein mixtures. It is also of use for the infants who are not gaining, and as a temporary food when pure milk cannot be obtained, as in traveling. Where only one bottle feeding is given a day, in breast-fed children, it is also useful. We generally use it in dilutions of 1 in 16, or 1 in 12, or 1 in 8. It should be measured in a graduated glass, as otherwise too much may be used, and it may be diluted with plain boiled water or, if desired, with a thin cereal gruel. The gruel may be made from the soy-bean flour and barley flour, a mixture which is particularly useful for this purpose. Cream may be added later, or olive oil may be given in addition. Orange-juice should be given every other day, or even every day, to prevent scurvy. If condensed milk is used too long without other feeding, anemia, scurvy, or rickets is liable to develop. Condensed milk furnishes about 100 calories per ounce.

Buttermilk.—Buttermilk has been much used in recent years, and is useful where it is necessary to use a food

low in fat and sugar. The curd of the milk is precipitated in small flakes and most children digest it easily. It also contains lactic acid bacilli in large numbers, and this may be of especial service in certain forms of intestinal trouble. It may be diluted with water or with cereal gruels, and sugar may be added if desired.

Acid Milks.—These are extensively used and are whole milk, to which lactic acid bacilli have been added. This milk is sold under various names, and often has other food substances mixed with it. It differs from buttermilk in having all of the fat left in it. It is of particular value in certain forms of diarrheal trouble and indigestion. It may be diluted to the same degree as ordinary milk. Kumiss and other fermented milks are sometimes used.

Albumin Milk.—This is a mixture which has been much used of late, and is sometimes called Eiweiss milk or protein milk. This is prepared by heating one part of the whole milk to 100° F., adding four teaspoonfuls of essence of pepsin and allowing the mixture to stand at 100° F. until the curd is formed. The mass is placed in a linen cloth and the whey strained from the curd. The curd is removed from the cloth and pressed through a fine sieve two or three times, using a wooden mallet or spoon. While doing this, one pint of water is added. The precipitate ought to be very finely divided and the mixture should look like milk. To this one pint of buttermilk is added. This milk mixture is low in sugar, contains lactic acid bacilli, and has a food value of about 370 calories to the quart. In the beginning it must not be mixed with any other kind of food, not even with human milk. The infant should be given only water,

usually for twenty-four hours, and then small amounts of the albumin milk given and, if all goes well, larger and larger amounts. Malt sugar or mixtures of maltose and dextrin are sometimes added. Albumin milk requires care in its use. It should never be employed except on physician's orders, as great harm may result from its improper use.

Gelatin.—In chronic intestinal disease gelatin is often added to the diet, mixing it with milk or giving it as a jelly.

Gruels.—Cereal gruels, as a rule, are made by cooking the flour and water for fifteen to twenty minutes. If the grains of the cereals are used, they must be cooked for from three to four hours. Barley, rice, oatmeal, cornmeal, and soy-bean flour are the most frequently used. Plain gruels cannot be made much stronger than 2 ounces to the quart. Dextrinized gruels may be made as high as 8 ounces to the quart. One level tablespoonful of the cereal flour weighs 1/4 ounce. The cereal flour contains about 100 calories to the ounce, so that underfeeding, which occurs when they are used alone, is easily explained.

Soy Bean.—From 1 level tablespoonful to 3 ounces of the soy flour are used to the quart. These gruels do not thicken during cooking, as they contain no starch and readily settle on standing. This may be overcome by adding 1 to 2 tablespoonfuls of barley, oat, or wheat gruel flour before cooking, which will add 0.6 per cent. to 1.2 per cent. starch to the gruels, and also slightly increase the percentage of protein. A good standard gruel, which may be diluted as desired, may be made by using 1 ounce of soy-bean flour, 2 ounces of barley flour to a

quart of water. This contains 2 per cent. protein, 0.6 per cent. fat, 5.10 per cent. carbohydrate, with a caloric value of 320 calories, or 10 calories per ounce. This is just half the value of milk. It is of particular use in marasmus, in using condensed milk, in cases in which cows' milk does not agree, and in certain forms of intestinal trouble.

Olive Oil.—This is useful where cream disagrees when foods low in fat are given, sometimes in constipation and other certain digestive disturbances. From 1 to 4 teaspoonfuls may be given daily, and it is best begun by using small amounts at first and then increasing gradually until the full amount is given.

Malted Milk.—This is a very valuable food for temporary use when pure milk cannot be obtained, and it is also of value in certain digestive disturbances. It may also be added in milk mixtures, and it is also useful in constipation. If used over considerable periods, orange-juice or other fresh juices must be given, and fat, either cream or olive oil.

Malt Soup.—Various malted preparations are used and are generally known as malt soups. Generally the malt-soup extracts of various kinds are used, but any thick malt extract and potassium carbohydrate may be used in making malt soups. Fifty grams (2 ounces) of wheat flour are added to $\frac{1}{3}$ liter (11 ounces) milk with constant stirring, and in a second vessel malt-soup extract, or malt extract, with the addition of 100 c.c. ($2\frac{1}{2}$ drams) of a 10 per cent. solution of potassium carbonate are dissolved in $\frac{2}{3}$ liter (20 ounces) of water at 120° F. The contents of the two vessels are then mixed and boiled from two to five minutes. This mixture has a somewhat higher food

value than cows' milk, and may be diluted with water as desired.

Malted Gruels.—These are prepared by making a cereal gruel in the ordinary way, then adding a teaspoonful of good malt extract or a teaspoonful of diastase. The mixture should be cooled before the diastase is added and then thoroughly stirred.

Beginning Bottle-feeding.—The percentages should be low at first, far below what would be given the child if it were accustomed to cows' milk. As soon as the infant's stomach is accustomed to the milk, it should be rapidly increased in strength until the proper mixture for the child in question is reached.

Technic of Modifying Milk at Home.—Great care and cleanliness should be used. The vessels and instruments used should, if possible, be kept solely for the use of the infant. All bottles, pitchers, and other utensils should be thoroughly boiled or scalded before using. The nursing-bottles should have rounded bottoms, to facilitate cleansing. It is a good plan to keep the bottles sweet by filling them with a solution either of boric acid or sodium bicarbonate, a teaspoonful of either drug to a pint of water. The nipple should be ordinary short black rubber ones and white rubber, and all nipples with tubes or complicated structure avoided, as they are hard to clean and are liable to lead to bowel troubles. It is a good plan to have several nipples on hand, and to boil them when first bought, and once a day afterward. They should be thoroughly washed after each using, turning them inside out for that purpose, and kept in a solution of boric acid or sodium bicarbonate. The milk should drop rapidly when the bottle is held upside down. If it does not run fast enough, the

holes in the nipple should be enlarged by using a red-hot darning-needle. If the flow is too free it may cause vomiting, and such nipples should be rejected.

It is best to prepare the entire quantity for the twenty-four hours at one time. If the weather is warm the milk should be either sterilized or Pasteurized, unless an exceptionally pure milk is being used. If neither can be done, the feedings may be prepared one at a time as needed.

The sugar, either milk or cane, is dissolved in hot water. If the solution is not perfectly clear, it should be filtered. This is poured into a pitcher with the lime-water or the soda, and the milk or milk and cream and other ingredients, if any have been ordered, should be added. After mixing, the nursing-bottles are filled with the proper quantity for each feeding, and the bottles stoppered with sterile raw cotton. The bottles are then sterilized or Pasteurized as directed, and then, after rapid cooling, are placed in the refrigerator. At the feeding-hour the bottle is heated and a nipple substituted for the cotton stopper.

FEEDING DURING THE SECOND YEAR.

During the second year of life as much care is required in feeding as during the first. The fear of the second summer would largely be overcome if the child were not allowed to eat food unsuited to its digestion. The fact that some children thrive on almost any kind of food is no excuse for permitting a child to have the same food as its elders, as is so often done. Most of the illness and many of the deaths of childhood are traceable to improper diet.

During the second year milk should form the basis of the diet. In cities or where the milk-supply is not

above suspicion, it is best to Pasteurize the milk until the second summer has been passed, or even longer if circumstances warrant. As a rule, the milk requires but little modification, and after the eighteenth month, and often before, may generally be taken unmodified. As the child is now able to digest starchy food, milk-sugar may be omitted. In cases where the milk is not thoroughly digested, as is evidenced by curds in the stools, lime-water may be used, and may be added in quantities of from 5 to 10 per cent., or even more if necessary. If the milk is very rich, it should be diluted either with lime-water or usually with plain sterile water—three parts of milk to one of water. If the milk is poor or if milk that is not rich does not agree with the child, it may be prepared as follows: Fill a glass three-quarters full of milk, add one or two tablespoonfuls of cream, and fill to the top with plain water. If this does not answer, add a tablespoonful of lime-water. During illness, and often under other circumstances, the alkaline carbonated waters will be found useful for diluting the milk. If the milk is poor, another plan is to use the upper two-thirds of the milk.

Starchy food may be given in the form of gruel, either alone or, what is better, mixed with the milk. Barley-gruel or, if there is a tendency to constipation, oatmeal-gruel is added, one-fifth or one-fourth part of gruel being added to each feeding. The gruel should be freshly prepared and mixed immediately with the milk. A pinch of salt and a very small quantity of cane-sugar may be added to render it more palatable. It may then be Pasteurized like ordinary milk.

During the second year five meals at about four-hour intervals should be given. The bottle should be dis-

pensed with and the food be taken from a cup or spoon. If the bottle is not taken from the child early, it may be difficult to break it of the bottle habit. The following diet-lists for different ages will be found useful:

Twelve to Fifteen Months.—Milk, barley-, oatmeal-, wheat-flour-, farina-, or arrowroot-gruel; barley- or oatmeal-jelly; lightly boiled yolk of egg, given with stale bread-crumbs.

Beef-, mutton-, or chicken-broth, chicken-jelly, beef-juice.

Orange-juice or the juice of other ripe fruit, as of peaches.

First Meal.—On waking, the child should receive a cupful of warm milk, modified as previously suggested. If the child is accustomed to waking very early, more milk may be given at about 7 A.M.; otherwise this last may be regarded as the first meal.

Second Meal, 10.30 A.M.—Eight ounces of warm milk and barley-gruel.

Third Meal, 2 P.M.—One of the following:

(*a*) Eight ounces (a cupful) of beef-broth.
(*b*) " " " " veal-broth.
(*c*) " " " " mutton-broth.
(*d*) " " " " chicken-broth.
(*e*) Yolk of a lightly boiled egg with stale bread-crumbs.

Fourth Meal, 5 P.M.—Eight ounces of milk and barley-gruel.

Fifth Meal, 10 P.M. (if required).—Eight ounces of milk.

Orange-juice, one or two tablespoonfuls at a time, may be given for one hour before the 10.30 A.M. feeding. If there is a tendency to loose bowels this should be omitted.

If the child's appetite is very good a small piece of zwieback may be given with either the second or the fourth meal. This should not be soaked in the milk, but the child should be allowed to nibble at it dry.

Fifteen to Eighteen Months.—Same as above, together with zwieback, stale bread (oven-dried), whole eggs very soft boiled; strained oatmeal, barley, or wheat-porridge; bread and milk, thin biscuit (crackers), junket, scraped raw beef or mutton in very small quantities.

A Sample Diet for a Child of Fifteen to Eighteen Months.—Breakfast, 7 A. M.—Either (*a*) two tablespoonfuls of a cereal jelly (oatmeal or other grain as desired), with salt and two tablespoonfuls of cream, and eight ounces of milk to drink; or (*b*) a bowl of bread and milk containing eight ounces of milk and a slice of stale bread.

Second Meal, 10.30 A. M.—Milk, with a cracker or thin slice of stale bread or a piece of zwieback.

Third Meal, 2 P. M.—One of the following: (*a*) Very soft-boiled egg with stale bread-crumbs. (*b*) Eight ounces of broth (beef, veal, mutton, or chicken) with stale bread-crumbs or a little barley added to it. (*c*) A tablespoonful of mashed baked potato with meat-broth or gravy (one to two ounces), or with two tablespoonfuls of cream. Milk to drink. (*d*) Scraped raw beef or mutton, two or three tablespoonfuls on a "banquet wafer," with a cup of milk. A tablespoonful of junket may be added to any of these.

Supper, 5.30 *or* 6 P. M.—Eight ounces of milk with a piece of zwieback, a slice of stale bread, or a cracker or two.

Fifth Meal, 10 P. M. (*if needed*).—Cup of milk.

Fruit-juice may be given, as previously directed. Eggs should not be given oftener than twice a week, as children tire of them easily.

Eighteen Months to Two and One-Half Years.—Milk is to be regarded as the chief article of diet. Many children have no desire for other foods until the second or third year. These children will generally be found to thrive on milk alone or with slight additions to the diet. As the child's digestive power increases, the following articles may, however, be added one at a time:

Fruit.—Juice of ripe fresh fruit, that of oranges and peaches being best. Ripe fresh grapes skinned and seeded. Baked apple—pulp only, the skin and seeds to be carefully removed. Stewed prunes, the skins to be removed by passing through a sieve.

Meats.—Scraped raw beef or mutton; rare roast beef or mutton pounded to a pulp. Chicken or turkey, the lean white meat minced to a pulp.

Vegetables.—Mashed baked potato with cream or covered with gravy from roast meats. If the latter is very fat, the fat should be removed by skimming or by means of a piece of blotting-paper. Very well-cooked spinach, celery, and cauliflower tops.

Cereals.—Well-boiled rice and other well-cooked cereals already mentioned.

Desserts.—Boiled custard, milk- and rice-puddings, junket.

Four meals will generally suffice after the eighteenth month. The following dietary will serve as a suggestion:

If the child wakes early, a cupful of warm milk (six ounces).

Breakfast, 7 A. M.—(*a*) Four tablespoonfuls of oatmeal-porridge or other cereal with salt and two tablespoonfuls of cream; milk to drink. (*b*) Yolk of a lightly boiled egg with salt and bread broken into it; milk to drink.

Second Meal, 10.30 A. M.—Cup of milk with two soda biscuits (crackers), slice of bread, or a piece of zwieback.

Dinner, 2 P. M.—One of the following: (*a*) A bowl (eight ounces) of meat-broth with rice, barley, or bread-crumbs added to it. Slice of stale bread; junket or rice- or milk-pudding. (*b*) Tablespoonful of white meat of chicken or of rare beef or mutton, either scraped or pounded to a pulp. Slice of stale bread thinly buttered, junket, rice- or milk-pudding, or a boiled custard. (*c*) Perfectly fresh boiled fish (the white meat) with a tablespoonful of mashed baked potato moistened with cream. Dessert as in preceding.

Supper, 5.30 *or* 6 P. M.—A bowl of bread and milk or a cup of milk and a slice of bread or a piece of zwieback. A cup of milk may be given at about 10 P. M. if necessary.

From two and one-half years up to the sixth year the diet of the child may gradually be increased. Milk should still, however, be taken in large quantities—about a quart daily—as well as some form of cereal for breakfast, with or without an egg, or fresh fruit if there is a tendency to constipation. Meat prepared as above should be given once a day, and preferably at the mid-day meal, together with potato and some green vegetable, as spinach, asparagus, or cauliflower tops. The evening meal should be light, and consist of bread and milk.

The Diet from Two and One-half to Six Years.—*Milk* may be allowed with every meal (may be omitted from dinner if desired). The average child should take a quart a day, plain or, when plain milk is not thoroughly digested, modified as for twelve to fifteen months.

Cream.—Two to eight ounces a day mixed with the milk, taken as a beverage, with cereals, etc.

Bread and *biscuit* may be allowed with every meal—stale bread, dried bread; the so-called "pulled bread," zwieback, and the various forms of biscuits or crackers.

Cereals.—Almost any kind of cereal for breakfast; oatmeal and wheaten grits are the best. Rice and hominy for dinner. Barley is useful in soups.

Vegetables may be allowed for dinner—potatoes in some form or a cereal with one green vegetable; spinach, cauliflower tops, and the like are the best.

Eggs are very good, but children are apt to tire of them easily. They should be given for breakfast, as a rule, but never day after day.

Meat.—Allowed once a day for dinner, and in older children for breakfast occasionally. Boiled or broiled fish may be given for breakfast or dinner.

Broths and *soups* of simple composition may be eaten. Meat-broths with cream and cereals are especially nutritious.

Desserts.—Once a day, with dinner. Plain custard, milk- and rice-pudding, bread- and custard-pudding, and junket are the best; ice cream once a week. Fruit should be given once daily, and only ripe fresh fruit, in season, should be used. The best are oranges, baked apples, and stewed prunes. Ripe peaches, pears, grapes without skins or seeds, may also be given. Fresh juice of berries in small quantity, strawberries in perfect condition sparingly. Ripe cantaloupe and watermelon in moderate quantities may also be allowed. Great care should be used in choosing and giving fruit to children. It is a very important article of diet, but if stale, spoiled or unripe, is capable of doing much harm. Too much should not be given in hot weather. Lemonade is useful during very hot weather.

ACCORDING TO MEALS.—*Breakfast.*—Every day, milk to drink. A well-cooked cereal with salt and cream, but little or no sugar. Bread and butter.

In addition to the above, one of the following every day: Eggs lightly boiled, poached, and for older children scrambled or made into a plain omelet. Boiled or broiled fish. For older children a very little finely chopped beef, mutton chop, or beefsteak. For younger children meat at breakfast is not, as a rule, necessary. Fruit may be given before or after breakfast, during the latter part of the morning, or at about noon—one variety daily; and if there is a special tendency to constipation, stewed prunes or baked apples may be allowed with the dinner, but not on the days on which they have been used earlier. Oranges, baked apples, stewed prunes, peaches, pears, grapes without seeds or skins; ripe apples (the softer varieties may be given; those known by the dealers as "hard" apples are not suitable unless cooked) are the most suitable.

Dinner.—Bread and butter as desired every day—not to be eaten to the exclusion of other foods, however.

One soup each day. Bouillon, beef, veal, mutton, chicken, or oyster-broth, which may be thickened with barley or other cereals (either grain or flour). Milk and cream may be added where desirable.

One meat daily—roasted or broiled. Beefsteak, beef, lamb or mutton chop, rare roast beef or mutton, chicken (white meat) or roast turkey.

Two vegetables daily—one green vegetable and one other dish, usually potato in some form, should be given. Potatoes, baked or mashed, cauliflower tops, asparagus tips, stewed celery, spinach, hominy, plain macaroni,

mashed peas, young string-beans, and almost any green vegetable in season.

Dessert.—Junket is the best and may be given most frequently, but rice- and milk-pudding, plain custard and plain tapioca-pudding may also be used in small quantities. Ice cream once a week. Fruit in some cases may be used.

Supper.—Very light simple suppers should be given every day. Milk, milk-toast, bread and butter, and, for older children, a little stewed fruit or baked apple without too much sugar.

ARTICLES FORBIDDEN (after Holt).—The following articles should not be allowed children under four years of age, and with few exceptions they may be withheld with advantage up to the seventh year.

Meats.—Ham, sausage, pork in all forms, salted fish, corned beef, dried beef, goose, game, kidney, liver, bacon, meat-stews, and dressing from roasted meats.

Vegetables.—Fried vegetables of all varieties, cabbage, potatoes (except when boiled or roasted), raw or fried onions, raw celery, radishes, lettuce, cucumbers, tomatoes (raw or cooked), beets, egg-plant, and green corn.

Bread and Cake.—All hot bread and rolls; buckwheat and all other griddle cakes; all sweet cakes, particularly those containing dried fruits and those heavily frosted.

Desserts.—All nuts, candies, pies, tarts, and pastry of every description; also salads, jellies, syrups, and preserves.

Drinks.—Tea, coffee, wine, beer, and cider.

Fruits.—All dried, canned, and preserved fruits; bananas; all fruits out of season and stale fruits, particularly in summer.

The meals should be given at fixed hours, which prac-

tice should be strictly adhered to. Feeding between meals, even when consisting of the most trifling things, should be avoided. If the child cannot go from one meal to another without discomfort, the intervals should be shortened. In certain cases it may be advisable to give a small cup of milk or broth and a cracker between the meals, at stated intervals, as in feeding younger children.

Candies, cake, and the like should be kept from young children. In well-regulated homes, if he once learns that he can not have them, the child will soon cease to demand sweets. The frequent indulgence in sweets of various kinds creates a desire for them to the exclusion of other food. This craving is analogous to that for alcohol in adults. Overindulgence in sweets causes indigestion, headache, and the like, ailments that may easily be prevented.

The child should be taught to eat slowly and to chew the food well. To this end, some older individual should always be present at meal-time to see that sufficient time be taken for the meal, and that the food be finely divided, as young children do not, as a rule, chew very well. The quantity given to a healthy child should depend on his appetite. In sick children this is not a reliable guide, and where possible fixed amounts may be given. The child should not be forced to eat, nor should he be given special articles to tempt the appetite. If the food offered is not taken, it is well to wait until the next meal, when it will generally be found that the appetite has returned. Loss of appetite is often merely an indication that the digestive organs require a slight rest.

During the heated portions of the year the child will require less solid and more liquid food. The same is

true during sickness. Many of the gastro-intestinal disturbances attributed to teething are the result of improper feeding.

DIET OF SCHOOL CHILDREN.

The period usually spoken of as "school days" is an extremely active one physically. The vast number of metabolic changes going on and the growth of the body demand a plentiful and a suitable diet. Both in and out of school and in seminaries careful attention should be given to food, fresh air, and exercise. In other words, the physical development should receive as much attention as the mental growth. In boarding-schools especially the diet should be the subject of careful study, the aim being to avoid monotony and to provide a sufficient and satisfying diet. In many schools the dietary is left to the discretion of the cook. In considering school dietaries several points are worthy of consideration.

Milk, being easily digested in most cases, is of great value, especially for children whose nutrition is below normal. It should be furnished as a beverage daily for breakfast and supper, and is advisable even with dinner. It may also be used in the preparation of puddings and soups. Cream is very valuable, and whenever possible should be supplied in sufficient quantities. A cup of warm milk with bread or crackers is helpful during the middle of the morning and as a substitute for tea in the afternoon. Delicate children and others may with advantage take a glass of warm milk a short time before going to bed. If the rising hour is some time before that set for breakfast, a cup of milk or of bread and milk should be given on rising.

Eggs may be used alone or in the preparation of various dishes. They may be used in almost any way except

fried. Fried eggs are apt to be very indigestible. They are often prepared in this way in order to disguise the stale taste of an egg that has been in storage for some time.

Meat is a very important part of the diet, as it contains a larger quantity of protein, from which the tissues are built up, and in a more available form, than in any other form of food. Milk and eggs are also valuable sources of protein. Meat should be provided, therefore, in sufficient quantities, a half-pound a day being, perhaps, a good average allowance for a growing boy, the larger and more robust taking that quantity or more, the smaller and more delicate children taking somewhat less. Steak, chops, and roasts of beef, mutton, lamb, fowl, and bacon are the most suitable meats, although pork, together with meat-stews, meat-puddings, sausage, and hashes, may be allowed in smaller quantities. These last, while generally relished, are not so digestible nor such good sources of nutriment as those first named. With care and proper preparation many of their ill effects can be obviated. More meat is required in winter than in summer, and more in cold climates than in warm. Yeo states that too much meat may give rise to eczema.

Meat may be given twice a day, and eggs or fresh fish may be substituted for it about three times a week. When these do not satisfy the appetite, meat may be added. For this purpose cold sliced meat is useful.

Bread and butter should be given with each meal. Bread made from the whole-wheat flour may be used in the largest quantity, but it is well to supply various kinds of bread, to avoid monotony. "Brown bread" given continuously becomes very tiresome. Rye-bread may be given occasionally, and bread made from mixtures of

wheat and rye is very palatable. Rusk, biscuit, and crackers may also be supplied. Corn-bread, when properly made, may be given once a week or oftener, and griddle cakes of buckwheat, corn, or wheat flour two or three times a week. These last may be served with syrup or fruit-juices.

Cereal porridges of all kinds may be given for breakfast, oatmeal being probably the most desirable.

Vegetables of almost all varieties may be used. For dinner two varieties should be given, one green vegetable and potatoes. Salads made of the green vegetables, with the very simplest dressings, are useful additions to the diet.

Fruit should invariably be given once a day.

Sugar should be provided for in the dietary. Candies and many of the sweets given to children are harmful and cause indigestion and dyspepsia. If proper sweets were provided there would be slighter tendency to indulge in the less desirable forms whenever opportunity offered. With the meals, and when the appetite demands satisfying between meals, they may be given with or without a glass of milk. Regularity should, however, be observed, and they should not be given immediately before or after a meal. Fruit-syrups, sugar-syrups, honey, preserved fruits, and jam may be eaten with bread. Caramels, chocolate, maple-sugar, and plain sugar-taffies are the best of the other forms of sweets.

Simple desserts, such as custards, milk-pudding with rice, tapioca and the like, bread-pudding, plain cakes, and properly prepared pastry may be used.

The beverages should be water and milk. Weak cocoa or chocolate may be given after the seventh year. Tea and coffee should not be given before the thirteenth year,

and may be withheld advantageously still longer. Alcohol is not to be used except by a physician's direction.

Especial care should be taken to avoid a monotonous diet, for there are many instances where the constant repetition of a certain form of food has created a dislike for it that has persisted throughout life or been overcome only with difficulty.

A second point to be remembered is that the food should be well prepared and attractively served. This has more to do with influencing the appetite of delicate, nervous children than is generally supposed, and can not be insisted upon too strongly.

Overeating should be avoided, and to this end an older person should always be present when practicable; in school, this should be insisted upon. On the other hand, a child should not, through caprice or habit, be allowed to eat too little. By exercising a little tact, most of the dislikes which are not deeply rooted, but which may become so if persisted in, may generally be overcome. These dislikes are often the result of imitation.

Sufficient time should be allowed not only for the meal, but for the performance of whatever small duties may be required of the child. A time should be set for one or two regular daily visits to the water-closet. Hurrying to school should be avoided. Reading and studying immediately before and after meals should be prohibited, as should bathing or any very active exercise. Some light form of recreation may, however, be indulged in. The hours of meals should be so arranged that the child may have freshly prepared meals, and not cold luncheons or warmed-over dinners. Lastly, nibbling and eating between meals, except under the conditions previously described, should be strictly prohibited. In spite

of stringent rules, however, many infringements will occur.

It is by neglect of the diet, fresh air, and exercise that many cases of tuberculosis gain headway; anemia may result from such neglect, and a delicate, nervous child be the outcome of one that should, by right, be healthy.

FEEDING IN INFANT ASYLUMS.

The feeding of infants in overcrowded infant asylums, with their lack of fresh air and paucity of attendants, is a matter of great difficulty. Any attempt at scientific feeding under such circumstances will ultimately lead to failure, the method in these cases being held to blame. The primary cause of malnutrition and marasmus in institutions is the lack of fresh air and individual care, and until these are obtainable it is useless to attempt to accomplish anything by special feeding methods. In the smaller institutions the use of the Materna graduate will be found satisfactory.

In the larger asylums it is well to have two or three general working formulas, such as fat 3 per cent., sugar 6 per cent., protein 1 per cent.; and fat 4 per cent., sugar 7 per cent., protein 2 per cent. These may be varied by adding more or less water to them to adapt them more closely to special needs. The younger infants may, when possible, receive special mixtures. For substitute feeding, condensed milk, barley- and egg-water will be found most useful.

The allowance of a few cents a day generally made for an infant's entire care is entirely inadequate to accomplish any good.

CHAPTER V.

THE FEEDING OF SICK INFANTS.

Stationary Weight; Loss of Weight.—The best index of nutrition is the weight of the child. If there is a stationary weight or the child loses weight the physician should be informed at once, as it may mean serious trouble. If neglected it may change an easily managed condition into an irremediable one. Panopeptone or Liquid Beef Peptonoids or similar preparations are frequently ordered for such children, and changes of various kinds made in the feeding.

Colic.—This is more frequent in breast-fed than in artificially fed children, and is most liable to occur during the first three months. In breast-fed children it may sometimes be due to the mother's milk being too rich, and measures are frequently prescribed to relieve this. The nursing intervals may be lengthened, and a little warm water given before each feeding to dilute the milk. In bottle-fed babies colic is most frequently due to the milk containing too much protein. It may also be caused by giving the milk too cold. Colic may be due to cold feet, chilling of the abdomen, and numerous other causes which have no relation to the diet.

Vomiting.—Vomiting occurring immediately after feeding is usually due to the child's taking too much food or the taking it too rapidly. Vomiting may be caused at any time by the abdominal binder being too tight, from shaking the infant or holding with the head

over the nurse's shoulder, or from patting on the back. Vomiting may occur at any time when the milk is too rich in proteins. It may be caused by coughing, and it is also a frequent symptom of many diseases. Vomiting one or two hours after feeding is usually due to the milk containing either too much fat or too much sugar, or both.

Gavage.—Gavage, or feeding by means of a stomach-tube, is a method used in various diseases and conditions of infancy and childhood. In cases where the child is not able to take nourishment, or only in insufficient amount, and in cases of uncontrollable vomiting, this method may be resorted to. It is used in the feeding of premature infants, whether in an incubator or not, and in cases of small, weak, marantic infants who, owing to weakness or lack of appetite, do not take sufficient nourishment. It is also employed after surgical operations about the head or neck where swallowing is interfered with, and in acute diseases, such as pneumonia, in fevers, and in delirium or coma.

The results that follow this method of feeding are surprising, especially in cases where there is constant vomiting or where the stomach has a very small capacity. In the former case, the vomiting may cease and the food be retained; in the latter, the capacity of a stomach that previously held only an ounce or two may rapidly be increased until an average-sized feeding is retained with ease.

The technic of the method is simple and the procedure conducted without difficulty in children under two years of age; above that age it may be difficult, and a mouth-gag may be required; in some cases nasal feeding must be substituted. The apparatus employed is the same

that is used for washing out the stomach; and since it is frequently desirable to wash out the stomach before introducing the meal, the same tubing may serve for both purposes. It consists of a soft-rubber catheter, connected by means of a piece of glass tubing to a piece of rubber tubing, to the other end of which a funnel is attached. The nurse holds the child in her lap, with the head held straight and not inclined in either direction. The catheter is moistened with warm water and held several inches from the end, so as to allow enough of it to pass into the esophagus with the first attempt at introduction. The mouth is opened, if necessary, and the catheter passed rapidly into the pharynx; there is usually a swallowing movement, and the tube is readily passed into the stomach. If the procedure is carried on too slowly the tongue may interfere; or if the catheter is held too near the end, it may cause gagging. Before introducing the food it is well to wash out the stomach with normal salt solution. As soon as all the food has entered the stomach, the catheter is pinched and rapidly withdrawn. If it is withdrawn slowly the food may come up with the tube. If the catheter is left open as it is withdrawn, the dripping into the pharynx may cause vomiting. If the child is young, it is a good plan to keep the finger between the jaws for a few moments, to prevent gagging. If the food comes up the feeding must be repeated.

Nasal Feeding.—For this purpose a catheter in proportion to the size of the child should be used. The procedure is the same as that for adults.

Feeding in Inflammations of the Mouth.—The food should be liquid or semisolid, and as bland and

unirritating as possible. If it is not taken readily it should be given cold.

Diseases of the Stomach.—Where there is marked vomiting and evidence of disease of the stomach milk should be withheld, and the patient given plain boiled water or albumin water in small quantities until the physician gives his orders concerning the feeding.

Cyclic Vomiting—Acid Intoxication.—This is not an uncommon disturbance of metabolism, in which there is a formation of acids in the body which cause recurrent attacks of vomiting. During the attack it is well to give the stomach absolute rest, as both food and drink tend to aggravate the condition. Sodium bicarbonate solutions may be given by rectum by the drop method or by simple rectal injections, and sometimes glucose solutions are also used. When the vomiting stops, the feeding may be begun very cautiously. Skimmed milk, to which citrate of soda or lime-water has been added, or peptonized milk or albumin water or barley water may be given to begin with, and the diet increased as circumstances warrant. Between the attacks the question of the diet is a very important one. Sometimes it requires considerable study on the part of the physician to determine what may be allowed and what withheld, but in most cases these patients do best on a diet of milk, eggs, green vegetables, bread, cereals, with the sweets almost entirely eliminated from the dietary. All cases are not alike, however, and various other forms of diet may be prescribed.

Diarrhea in Infancy and Childhood.—In a child under two and, indeed, even in older children, one can never say at the outset whether a diarrhea will be mild or severe. It is therefore well to diet all cases as if they were of a virulent type. By so doing many lives will be

saved and much suffering avoided. About 97 per cent. of the deaths from diarrhea occur in bottle-fed babies, and the majority of these in the hot weather.

In breast-fed children a diarrhea in winter is usually a mild one, and merely lengthening the nursing periods to six hours and giving barley, rice, or albumin water in the intervals at the feeding times is all that is needed. After a day or two of this, together with the proper medical treatment, the child can generally resume its customary schedule.

In summer, however, a diarrhea, especially if severe, should arouse suspicion, and for twenty-four hours, or until the child's condition warrants, milk should be withheld. The breasts should be pumped out carefully at regular intervals, to prevent distress or a possible cessation of the secretion. The child should be given plain boiled water, or some of the articles previously mentioned, at frequent intervals and in small doses. If there is great thirst, one or two teaspoonfuls should be given every fifteen or thirty minutes. If fluid is well retained, several ounces may be given at a time, at intervals of two or three hours. Stimulants are often ordered, or small doses of the liquid beef preparations may be tried, such as Panopeptone, Liquid Beef Peptonoids, tonic beef and similar preparations, diluted and given cold. Small doses should be given, and if these foods are diluted sufficiently the laxative action they are supposed to exert will not be obtained. If by the second day vomiting has ceased and the child seems better, it may be put to the breast for a few minutes and the effect noted. If the milk is well borne the child may be given the breast every six hours, shortening the interval from time to time until the child has returned to its regular schedule.

It is well to make a gradual return, and if the milk aggravates the diarrhea or gives rise to other symptoms, it should again be discontinued. When the breast milk is of good quality there is rarely any difficulty with these cases.

In bottle-fed babies every diarrhea, especially during warm weather, should be treated as serious, and certain precautions be taken. For the first twenty-four hours it is a good plan to withhold all food and give plain water, as previously suggested. Milk is absolutely contra-indicated, and must not be given until recovery is complete. Under this plan, if the diarrhea is a simple one, recovery is rapid. The child's appetite and condition must govern the increase in diet. Albumin water, rice or barley water, and whey are excellent foods to begin with. If these are well borne, malted milk may be given, followed, if all goes well, by cows' milk. It is a good plan, if the child is old enough to digest it, to mix equal parts of barley water and milk together and boil them for a few minutes. This is usually well borne, and may be the first step in the return to the customary diet.

In the infectious forms, so long as the disease is in its active stage, milk, since it furnishes an excellent culture ground for the pathogenic bacteria, acts as a poison. In these severe cases no food should be given for twenty-four hours. Plain boiled water or very weak albumin water may be given in small doses at frequent intervals. Stimulants are frequently ordered at this time. Washing out the stomach and giving it absolute rest will frequently check the vomiting. A common mistake is that of putting too many drugs and foods into an irritable, nauseated stomach. Absolute rest several hours will frequently allay this irritability.

If the diarrhea continues while the stomach is at rest, there is liable to be great thirst. This may in a measure be allayed by small bits of ice chipped off with a needle and placed in the child's mouth, or the mouth may be sponged out with water to which a little lemon juice has been added.

If the amount of fluid extracted from the body renders collapse probable, or if the child seems greatly weakened, the subcutaneous infusion of normal salt solution is often used. This should, of course, be given under aseptic precautions. One or more ounces may be given at a time, eight ounces being the average amount for twenty-four hours. It is astonishing how rapidly this mixture is absorbed.

When the vomiting ceases and the child becomes more comfortable, food will usually be retained. Albumin water, Panopeptone and water, whey, rice water, and barley water are the most suitable foods. The cereal waters agree admirably with some children but not with others. If the child does not take them plain they may be sweetened.

The return to milk should be made very gradually. In the severe cases cows' milk should be withheld for a week, when, if the child's condition permits, it may be tried in one small feeding. If it causes no trouble, it may gradually be added until the usual diet is resumed. The return is best made by allowing the articles previously suggested. Then malted milk, or one of the dry foods that is to be mixed with water, may be given, followed by partially or wholly peptonized milk or the barley water and milk mixture previously described. Plain well-skimmed meat broths, such as veal broth, may be used. Care must be taken to remove all the fat, as this is a frequent source

of trouble. The milk should not at first contain too great a percentage of fat. This bold starvation plan, as it is sometimes called, succeeds better than any other. Later, however, care must be taken that the periods of underfeeding be not too protracted, for while it is desirable to "starve out the diarrhea," the child must not be starved to death during the process. A day or two of absolute abstinence from food does no harm, as in the severe cases food is not retained, or if retained, is not assimilated; on the other hand, a reduced diet continued for weeks and months, as is not infrequently done, is apt to prove disastrous. It is a good plan to keep an accurate record of all the food taken while the child is on a restricted diet. The amounts taken during each twenty-four hours may be added together, and from these it may readily be seen whether or not the child is getting sufficient nourishment.

Diarrhea in Older Children.—When diarrhea occurs in older children, the early dietetic treatment is similar to that recommended for infants. As the child recovers a return to the ordinary diet may be made, meat, eggs, and broths of various kinds being given at first, followed by boiled milk and toast or dry bread. Vegetables and fruits should be given only after recovery is complete, and their effect should carefully be watched. Cereals may also cause a recurrence of the trouble, and should be most thoroughly cooked and given in small quantities at first.

Chronic Intestinal Indigestion.—The diet in this disease will always be carefully outlined by the physician, and it is of the greatest importance to see that the directions are carried out. The disease is often protracted, and requires months or even a year or two of

careful dieting to relieve the condition. The carbohydrate foods are usually reduced to a minimum and easily digestible proteins given. Slight indiscretions in diet frequently lead to relapses in which all the ground gained in several months is lost by a single improper meal.

Constipation.—This is frequently difficult to overcome. Fruit juice given on an empty stomach an hour before a milk-feeding is of service, as are olive oil and cream. These latter must not be used indiscriminately, as they may give rise to other bowel trouble if given in too large quantities. The malted foods, such as Mellin's, are useful; mixed with milk or oatmeal gruel well sweetened they may relieve it. In older children figs and prunes stewed together are of value; oatmeal and bread from unbolted flour may be used. A glassful of water given on rising is sometimes of assistance.

Wasting Disease.—The diet is of primary importance, but fresh air and exercise and warmth must not be overlooked. The infant should in all cases be fed in the nurse's arms and never in its crib. The diet is prescribed by the physician.

Rickets or Rachitis.—This is due to a diet containing too little fat and protein and too much carbohydrate. The normal diet should be given, and cream, olive oil or cod-liver oil added to the dietary.

CHAPTER VI.

DIET FOR THE AGED.

WHEN a man has passed his fiftieth year his diet should be guarded. Dietary indiscretions or a too plentiful diet will result either in the putting on of flesh, and the consequent discomforts of obesity, or in the development of gout or allied affections. In considering the diet of the aged the old dictum, that a man is as old as his arteries, applies. Age can not always be counted by years. In the aged there is a lessening of all physical activities. The old man takes less exercise, has diminished powers of digestion, and is less able to absorb the nutriment he has digested. His circulation is poor and his bowels are constipated. Degenerative processes have taken place in his organs, and he is more apt to feel the effects of indiscretions in diet. For these reasons the diet should be lighter than in his younger years, and the amount of food eaten should vary with the needs of the individual. The food should be of an easily digestible variety; it should be given in smaller quantities at a time and the intervals between meals should be shortened. If there is a tendency to obesity, food that is liable to be converted into fat should be given in diminished amounts. The proteins should be somewhat lessened from time to time. The practice of eating heavy suppers late at night and of eating between meals should be discontinued. The person should learn what particular articles of food disagree with him, and refrain from eating foods that tend

to cause flatulence. Yeo suggests that in the case of cooked fruits a small quantity (about a teaspoonful to the pound of fruit) of sodium bicarbonate be stewed with them, to correct the acidity that causes flatulence.

In the aged, food bears a close relation to sleep. A cupful of hot milk, hot toddy, or some hot liquid food taken at bedtime will often overcome troublesome sleeplessness. A few sips of milk or a mild stimulant taken during the early morning hours, when the aged are apt to awaken, will frequently insure sleep again.

Food Suitable for the Aged (Yeo).—Young and tender chicken and game and other tender meats; potted chicken, game, and other potted meats; sweetbreads; white fish, as sole, whiting, smelts, flounder, etc., best when boiled; bacon grilled; eggs lightly cooked, or beaten up with milk, etc.; nutritious soups, such as chicken or fish purées, beef tea, mutton and chicken broths; milk in all forms when easily digested. When it is not well borne, the addition of an equal quantity of warm Vichy or of warm water will often prove helpful. Beef tea and milk supply the needed mineral substance, and the former is an excellent stimulant.

The following foods are all suitable: Bread-and-milk with the crumbs of stale bread and without lumps; porridge and oatmeal gruel; puddings of ground rice, tapioca, arrowroot, sago, macaroni, with milk or eggs, and flavored with spices or served with fruit juice or jelly; bread and butter, the bread to be at least a day old; rusk, to be soaked in tea or milk and water. Prepared foods, consisting of predigested starches; at this age the digestive ferments are provided scantily by the digestive organs, and soluble carbohydrates are valuable for maintaining the body heat. All farinaceous foods should be

subjected to a high temperature for some time during the cooking process so as to render the starch granules more digestible.

Vegetable purées of all kinds may be taken in moderation—*e. g.*, potatoes, carrots, spinach, and other succulent vegetables. Potatoes and fresh vegetables are a necessity; if omitted a scorbutic state may be engendered. Stewed celery and stewed Spanish or Portugal onions lend variety to the diet. Stewed or baked fruits, fruit jellies, and the pulp of perfectly ripe raw fruits in small quantity may be taken.

CHAPTER VII.

DIET DURING PREGNANCY AND THE PUERPERIUM.

During Pregnancy.—The diet should be that to which the patient has been accustomed. There is often craving for unusual articles of diet, and these cravings should not be gratified. Sometimes a diet somewhat deficient in carbohydrates and fluids is advised with the idea of producing a small child, a thing desirable when there are contractions of the pelvis and a difficult labor is expected.

Diet During the Puerperium.—Formerly great restrictions were placed on the diet of a recently delivered woman, thus accounting, in part, for the loss of weight that has been noted. If there is no nausea and the patient desires it, a cupful of tea or a glassful of warm milk may be given soon after delivery.

The appetite is generally poor for a few days after delivery, but food should be given at regular intervals not too widely separated. The first day milk, milk toast, or if desired, dry or buttered toast, with coffee, tea, or cocoa, according to the taste of the patient, may be given. Water may be allowed as desired. On the second and third days simple soups or any of the following may be added to the dietary: Meat broths, beef tea, soft-boiled or poached eggs, raw or stewed oysters, and some simple dessert, such as wine jelly, boiled custard,

or junket. During the next few days chicken, scraped beef or mutton in small quantities, baked potato, rice, and cereals may be given, and by the end of the week a gradual return to the ordinary diet may be made.

Diet in the Diseases of Pregnancy.—Special diets are sometimes ordered the pregnant woman on account of diseases connected with her pregnancy. Sometimes a milk diet or a diet similar to that used in inflammation of the kidneys is used. When salivation occurs a milk diet is used. Rectal feeding is used when there is uncontrollable vomiting.

CHAPTER VIII.

RECTAL FEEDING.

When the patient cannot take food by the mouth, or when it is not desirable to feed him in that way, rectal feeding is resorted to. All the various classes of foods may be used for this purpose. Proteins are supplied in the form of predigested meat or egg albumin to which salt has been added. Nutrose and peptones are also used. Grape sugar and starch are sometimes employed. Fat is given in the form of the yolk of egg or cream. Milk is also much used. Where the patient is to be fed by the rectum for any length of time, combinations of these are used as suggested in the formulas given below. Bauer believes that but one-fourth of the nutriment needed by the body can be absorbed by the rectum, and both he and the earlier writers placed the length of time which rectal feeding was practicable at from one to two weeks. With careful technique, this period may be extended from four to six weeks, depending on the capacity of the individual for continued absorption, and on the amount of energy stored up in his body at the beginning of the rectal feeding; but von Leube has kept a patient alive for six months, and Riegel for ten months on exclusive rectal feeding. As a rule, however, as only about one-fourth, and often even less, of the amount of nutriment needed can be absorbed, the method is only useful in protecting the body from excessive loss during periods of partial or complete starvation.

The success of rectal feeding depends on the proper technic. With poor technic the rectum soon becomes irritable.

Procedure.—The rectum should be cleansed thoroughly by administering a high injection of normal salt solution one hour before the enema is to be given. This cleansing should be practised at least once a day, and if much mucus is present it may be well to precede each feeding by a cleansing enema. If the rectum is inflamed a solution of boric acid may be used instead of the salt solution; or if there is much mucus a solution of sodium bicarbonate may be employed, a teaspoonful of either to the pint of water being sufficient. For the first one or two cleansing enemata the bowel should be flushed by the ordinary method; later, a return-flow catheter may be used; with this several quarts of solution may be used; without it one-half to a pint will be sufficient in most cases.

The temperature of the cleansing enemata should be between 95° and 99° F.; that of the enemata which are to be retained between 90° and 95° F. Solutions that are too hot or too cold will promptly be rejected.

The position of the patient is very important. He should lie on his side, with the hips well elevated. On account of disease this position may be impracticable. In this case the foot of the bed may be raised and pillows placed under the hips, to make as much elevation as possible. A rectal tube or a large catheter should be used. This should not, however, be too large; a tube 1 cm. (about ½ inch or less) being the proper size for an adult. For children the tube should be proportionately smaller. It should be lubricated thoroughly, but glycerin should not be used for this purpose.

In introducing the tube it should be twisted slightly,

which lessens the liability of its becoming impacted in the rectal folds. If it is not passed easily a small quantity of fluid should be allowed to flow in, which will serve to balloon out the rectum, after which the tube may usually be passed with ease for 8 or 10 inches or more. The tube should in all cases be introduced as high up as possible, as the enema is thus more likely to be retained and absorbed.

The fluid should be allowed to flow in slowly from a funnel or a fountain-syringe. In some instances, where very small injections are being used, a small hard-rubber syringe may be attached to the tube. Care should be taken to avoid injecting air with the fluid. The method of administering nutrient enemata by means of the old-fashioned short hard-rubber nozzle of either a piston or a Davidson syringe can not be too strongly condemned. In the hands of the unskilful it may cause injury to the rectum, and even if used by a trained nurse, only succeeds in placing the fluid in the lower part of the rectum, where it is liable to be expelled.

After the injection the patient should lie as quietly as possible for at least an hour, and be instructed to try to retain the contents of the bowel. A pad of gauze or a towel should be pressed over the anus for twenty minutes or half an hour, and the mind should, if possible, be diverted from the subject. After a few days the bowel often acquires a tolerance for the injections and they may be retained without difficulty.

If the rectum is irritable and the fluid rejected, the physician may order the nurse to precede the nutrient enemata by a small suppository containing opium, or, what is better, a small rectal injection of the tincture of

opium may be given. This may be mixed with a little starch water, but the whole should be as small as possible. The opium should not be used unless necessary, and the dose should be just sufficient to quiet the bowel. The opium may be added directly to the enema.

If there are hemorrhoids, rectal feeding will be greatly interfered with. Before each injection they may be painted with a 2 per cent. cocain solution, and between the feedings a soothing ointment should be applied.

The amount to be given at each injection is an important factor. As a rule, it should not exceed ¼ liter (½ pint). If this be not well borne the amount may be reduced to from 30 to 100 c.c. (1–3 oz.).

The number of enemata to be used will depend somewhat upon the patient's constitution; as a general rule, five, or better six, hours should be allowed to elapse between each feeding.

It is well to remember that packing in the vagina and other gynecologic dressings may interfere materially with the injection of fluid in the bowel.

The patient's mouth should be kept very clean, and the patient may be allowed to rinse it from time to time to help allay the thirst, which is usually intense. Under some circumstances water may be taken into the stomach, but where absolute rest of the stomach is indicated, not even that should be allowed. Enemata of weak salt solution may be given to relieve thirst, or salt solution may be given subcutaneously.

A part of the good effect of the nutrient enemata is the mental satisfaction following it, similar to that following a meal. The patient having also the feeling that he is not being allowed to starve.

Nutrient Enemeta by the Drop Method.—Since Murphy's introduction of continuous protoclysis by the drop method, the administration of nutrient enemata by the same plan has been practised by various clinicians. Eberhard has recently called especial attention to this method of treatment. His apparatus consists of an ordinary quart can, inside of which is placed another can holding a pint. These are connected by an 8-inch pipe, which penetrates the bottom of each and projects about 2 inches. A small pet-cock, soldered to the base of the outside, can allow water to be withdrawn at will. Milk and egg or any other nutriment placed in the smaller can is kept warm, and flows freely on account of its being surrounded by hot water. Water at a temperature of 110° to 115° F. seems to answer all purposes. The remainder of the apparatus is the same as used for saline enteroclysis. To insure absorption the bowel must be cleansed by an enema each day. The flow must be regulated to about a drop a second. According to Eberhard, in one and a half hours 10 ounces of milk and 2 raw eggs flow into the bowel.

Eberhard has had the best results from the following enemata:

Albumin of 3 eggs	90	calories;
Peptonized milk, 9 ounces	174	"
Table salt, ½ dram	0	"
	264	"

Warm milk, 9 ounces	174	calories;
Yolks of 2 eggs	122	"
Grape-sugar, 1 dram	14	"
Table salt, ½ dram	0	"
	310	"

Warm milk, 9 ounces	174	calories;
2 raw eggs	122	"
Table salt, ½ dram	0	"
Essence of pepsin	0	"
	296	"

Heat the milk to 98° to 100° F., then beat the eggs, salt, and pepsin together, and, last of all, add the milk and heat again until it drops easily.

Another formula:

2 raw eggs	140	calories;
1 pint of normal saline	0	"
	140	"

The drop method is especially indicated in persistent vomiting, in hemorrhages, stenosis of the esophagus or pylorus, in carcinoma of the stomach, and in most conditions in which nutrient enemata are ordinarily employed.

Recipes for Nutrient Enemata.—Dujardin-Beaumetz's Nutrient Enema.—

1 cupful of milk;

2 or 3 tablespoonfuls of liquid or 2 or 3 teaspoonfuls of dry peptone;

1 yolk of egg;

5 drops of laudanum;

7 gr. of sodium bicarbonate if the peptone is acid.

Von Leube's Milk-peptone Enema.—

250 c.c. (8 oz.) milk	170	calories;
60 gm. (2 oz.) peptone	100	"
	270	calories.

In place of the peptone a 30 to 50 per cent. solution of soluble protein may be used.

Egg-and-milk Enema.—

250 c.c. (8 oz.) milk . . .	170 calories;
3 eggs	200 "
3 gm. of salt.	
	370 calories.

Starch-and-milk Enema.—

60–70 gm. (about 2 oz.) starch	250 calories;
250 c.c. (8 oz.) milk . . .	170 "
	420 calories.

Sugar-and-milk Enema.—

60 gm. (2 oz.) grape sugar .	246 calories;
250 c.c. (8 oz.) milk . . .	170 "
	416 calories.

Pancreas Enema.—

50–100 gm. (1⅔–3 oz.) pancreas substance, average	300 calories;
150–300 gm. (5–8 oz.) meat 30–45 gm. (1–1½ oz.) fat .	350 calories;
	650 calories.

Singer's Enema.—

125 gm. (4 oz.) milk;
125 gm. (4 oz.) wine;
1 or 2 yolks of eggs;
Salt;
1 teaspoonful of Witte's peptone.

May be given three, or possibly four, times a day and is well borne.

Riegel's Enema.—

250 c.c. (8 oz.) milk;
2 or 3 eggs;
Salt;
1 or 2 teaspoonfuls of red wine.

Riegel does not use peptone, as he fears that it might irritate the rectum and cause diarrhea.

Ewald's Nutrient Enema.—

2 or 3 eggs;
1 tablespoonful of water.

A small amount of flour is boiled in half a cupful of 20 per cent. solution of dextrose and a wineglassful of red wine added. The egg solution is stirred in, care being taken not to have the solution too hot, lest the albumin be coagulated. Entire amount, 250 c.c. (8 oz.).

A Frequent Army and Hospital Formula.—

3 to 5 eggs;
150 to 250 c.c. (5–8 oz.) 15 to 20 per cent. solution of dextrose.

Add a little starch solution or mucilage to make it more viscid, and a few drops of tincture of opium.

Boas's Formula.—

230 c.c. (8 oz.) milk;
2 yolks of eggs;
A small quantity of salt;
1 tablespoonful of red wine;
1 tablespoonful of "Kraftmehl" (Health Flour).

Jaccoud's Recipe.—

250 c.c. bouillon;
120 c.c. wine;
2 yolks of eggs;
4–20 gm. (1–5 dr.) dry peptone.

OTHER METHODS OF NOURISHING THE BODY.

Duodenal Alimentation.—Einhorn, Morgan, and others, following the suggestion of the first-named investigator, have used a duodenal tube, not only as a matter of diagnosis, but for feeding certain classes of cases. At present the tube has been used in those cases in which it was thought desirable—to rest the stomach—as in cases of persistent vomiting and in certain gastric and duodenal ulcers. The ordinary Einhorn tube is used, and care should be taken to see that it is in place before the feeding is started. This may be done by gentle traction, which shows a slight resistance if the tube is in the duodenum; by aspiration, which will often bring up golden-yellow duodenal juice without any gastric secretion; or perhaps best, by giving the patient some liquid to drink by mouth and immediately performing aspiration. If the end of the tube is in the stomach, the fluid can be removed. Any liquid food may be employed, but mixtures of milk, sugar, and raw eggs are the most useful. Care should be taken to see that there are no particles in the food that might clog the tube. The amount at the beginning should be small, 100 c.c. every two hours, beginning early in the morning and stopping late in the evening. This quantity may be gradually increased up to 300 c.c. If eight feedings are given to twenty-four hours, and each feeding consists of 280 c.c. of milk, 1 egg, and 1 tablespoonful of sugar of milk, the patient will receive approximately 2280 calories, which is ample for an average individual, and if the patient is at rest in bed, it is sufficient to allow a gain in weight.

Einhorn has perfected a special syringe, with which it is possible to administer the food without disconnecting

the tube. Morgan has suggested a method like that of Murphy for giving salt solution per rectum, permitting the fluid to flow from an irrigating jar, and so arranging the pet-cock that the food is taken slowly, the 300 c.c. of nourishment taking about twenty-five minutes. The food should be administered at body temperature, and the heating should be done slowly, for if it becomes too hot it is liable to become thick and lumpy. After heating it is well to strain the food to be certain to have it free from small particles. If the food is used too warm or too cold it is apt to cause uncomfortable symptoms, sometimes causing the patient considerable shock; a too rapid administration causes flatulence. After each feeding the syringeful of water, at 98° F., should be injected, then the pet-cock closed, and the syringe filled with air, which should be injected after the pet-cock has been opened; the pet-cock should then be closed and the syringe disconnected. This procedure is very important, and serves to keep the tube clean and empty. If this is not done, small masses of food are apt to be drawn into the lower part of the tube, and this may necessitate its removal. This method of feeding should not be used outside of the hospital, unless it is done by a nurse who has been specially trained for the purpose. In unskilled hands mistakes are very liable to be made, which cause the patient great discomfort.

Saline Irrigations and Infusions.—1. Saline Rectal Irrigations.—Rectal saline injections are especially useful in all conditions associated with hemorrhage; also in the various infectious diseases, as well as in intoxications and in those conditions in which it is necessary to allay thirst.

The fluid used should be a normal salt solution, and

should be given high with the rectal tube; if it is necessary to prepare such a solution quickly, a teaspoonful of salt may be added to a pint of water and rapidly injected by means of an ordinary fountain syringe. The fluid should be about the temperature of the body, and should be administered slowly, while the patient is in a reclining position. As much as ½ to 1 quart of the fluid can be utilized at one time.

The Murphy Method for Administering Solutions by Rectum.—A very useful method of administering salt solutions and other fluids is by continuous proctoclysis by the drop method, as suggested by Murphy. This may be used whenever it seems advisable to increase the amount of fluid in the system. It is of particular service when there has been a loss of blood, and also useful to fill up the system so that further lymphatic absorption is impossible, as after operations about the thyroid. It may also be used when fluids cannot be taken by the stomach. Normal salt solution may be used or the solution advised by Murphy, a dram each of sodium chlorid and calcium chlorid to the pint of water. In cases of great weakness, whisky or an infusion of coffee may be added to the salt solution.

The method of administering the fluid is important. A fountain syringe, or a salt solution flask, with a rubber tube attachment, terminating in a vaginal hard-rubber tip, or a catheter, may be used. After the insertion of the tip or catheter into the rectum, the flask is filled with salt solution and suspended from 4 to 10 inches above the level of the rectum of the patient. The solution is kept in a temperature of 100° F. by surrounding the flask with hot-water bags. An improvement on this is to use one of the simple devices which are on the market

for regulating the drop. This may be done by using a funnel, and so regulating the pet-cock on the flask that the fluid escapes a drop at a time. The devices just mentioned are more satisfactory and require less attention. Care and judgment should be used not to overload the patient with water and so overburden the heart.

Plain Water Injections.—In place of using normal salt solution, ordinary water may be used, as suggested by Lawson, 1908, and more recently by Trout. The advantages of the plain water are that it is absorbed in larger quantities and more rapidly. Patients given salt solution by rectum require nearly twice as much water by mouth to relieve thirst as those given plain water.

The patient does not complain of tasting salt, as is often the case when salt solutions are used. In peritoneal cases in which there is drainage, larger quantities of salt solution or plain water may be used than under other circumstances.

Other Solutions.—Foods of various kinds, as mentioned above, may be administered by this method, and glucose solutions, 30 grams (1 ounce) to the liter of water, or normal salt solution may be used to advantage, especially in cases of threatened or developed acidosis, as in diabetes or following anesthesia.

2. Saline Infusions.—Saline infusions are given subcutaneously, and are especially useful in cases in which rectal saline irrigations cannot be utilized, as in certain intestinal diseases, or when an immediate effect is required, as in sudden collapse from hemorrhage or from shock. They are also useful in cases when large quantities of fluids have been lost by the body, as in the diarrheas of dysentery and of cholera; in various infectious conditions and intoxications, as in pneumonia, erysipelas,

and typhoid fever; and in the uremia of chronic Bright's disease. The most convenient location for administering the infusion is between the chest-wall and the mammary gland, or deeply into some muscle, as in the lumbar region, abdominal wall, or buttock. The injection should be given under the most aseptic precautions. No apparatus is required beyond a fountain syringe, to which an aspirating needle is attached. The infusion should be warm and should be allowed to run in slowly; frequently as much as 1 to 2 quarts can be injected into one place. The mixture used is a normal 0.6 per cent. salt solution. In certain cases Cushing[1] prefers the following solutions:

Sodium chlorid	0.900
Calcium chlorid	0.026
Potassium chlorid	0.010
Distilled water	99.064
	100.000

Combs has reported a fatal case of sodium chlorid poisoning. By mistake 1 litre of saturated salt solution was ingested hypodermically. When seen four hours later she was comatose. After about six hours of coma, a period of excitation followed, she was maniacal, and talked incoherently. This condition persisted for twenty-four hours, when she died. 124.4 gm. (1928 gr.) of sodium chlorid had been used.[1]

[1] Cohen's *Physiologic Therapeutics*, vol. ix., p. 289.

CHAPTER IX.

GENERAL RULES FOR FEEDING THE SICK.

THE nurse should understand the importance of the proper feeding of the patient. Definite directions as to how much food, its form, its preparation, and how often it is to be given should be written out by the physician. In all acute serious conditions, as in pneumonia or in typhoid fever, a record of these details should be kept, together with the record of the quantity of fluid taken, the medicine given, etc.

There is usually a tendency to err in either extreme—that of giving either too much or too little food. Care should be taken that the patient's wishes are, wherever practicable, carried into effect. The nurse should carefully observe the patient's likes and dislikes, and also note his idiosyncrasies. A tactful, observing nurse is of inestimable value, but a careless or stupid one is an ever-present source of danger.

The training of nurses in regard to feeding is often faulty. Every nurse should be instructed in the subject of practical dietetics, and should know how much food is required by the different types of patients.

The food should be given at regular intervals. In unconscious or semi-conscious patients this is of great importance; but it is just as important in the conscious, as the appetite usually comes on at certain times, and if the meal is not forthcoming may disappear.

The appetite of the conscious patient and of the con-

valescent should be fostered, and nothing done that may in any way disturb it. Patients vary much in this particular, but, as a rule, individuals who are not overfastidious when they are well become so when weakened by disease.

The sick-room should be orderly, and no dishes, utensils, or food be allowed to stand about the room either before or after using. All food and drink should be offered from scrupulously clean glasses or dishes. These should be as dainty as possible, and the food must be made attractive in appearance; when the dish permits, it may be garnished with a sprig of green. The napkins and linen should be spotless. The exterior surface of glasses and cups should be wiped dry before they are offered to the patient.

Food that is stale or that has acquired an unpleasant taste from standing in a refrigerator together with other things should not be given. A strong egg in an egg-nog may be the means of turning a patient forever against this form of nourishment. The food should be tasted by the nurse, but never, when possible, in the patient's presence or with the same spoon. If there is anything wrong with a dish, this should be discovered and remedied before it is brought to the patient.

A nurse should always remember the eternal fitness of things. Utensils and dishes should be used only for the purpose for which they are intended and not as makeshifts for other articles. After caring for the patient or removing evacuations sufficient time should be allowed to elapse before feeding is begun. The patient should be made to feel that the utmost cleanliness and care have been observed. The hands and face of the patient

should be wiped with a moist cloth and then dried before food is given, and the lips cleansed after the meal is completed.

The position of the patient should be as comfortable a one as possible, and one in which he will not tire before the meal is ended. If the patient is weak, the food should be given in such form that he may take enough of it without inducing fatigue; otherwise he may become tired of masticating and swallowing and take an insufficient amount. Patients who can sit up in bed should be provided with a bed-tray on which to place the food. The legs of the tray should be placed high enough for the patient to eat comfortably from it.

If the patient is helpless, care should be exercised in giving food, so that it will not be drawn into the lungs during inspiration or coughing. This may be avoided by giving the food slowly and by seeing that each mouthful is swallowed before another is given. These patients may be fed in various ways. The food may be given from a spoon, or, what is usually preferred, from a drinking-cup with a spout, or by using a tube and allowing the patient to take the food from a glass. When the patient is taking bread and similar solids great care should be exercised not to allow the crumbs to fall into the bed.

In most severe illnesses it is necessary to awaken the patient during the night to administer food. This is a point that requires special judgment. Often the patient is more in need of sleep than of food. If the patient does not drop off to sleep very soon after taking food, it may be better to wait until he awakens before giving it. As a rule, however, in severe illness the sleep is disturbed for but a few minutes by taking food. A

cupful of warm milk or similar food may often induce sleep.

The patient's mouth should always be kept clean. If dry and parched, it should be rinsed before and after taking food. Alkaline mouth-washes may be used; boric acid and water also make an efficient wash. If the mouth is dry, it should be moistened from time to time, and for this purpose a little glycerin water and lemon juice will be found useful. If the patient is helpless the mouth may be swabbed out with cotton fastened to the end of a stout probe or wound about the finger. This should be moistened with some antiseptic solution.

In all cases where the illness is likely to be protracted, arrangements should be made to care for and prepare the food with as little discomfort to the household as possible. For this purpose a diet kitchen may be improvised, preferably in a room adjoining the patient's. If the patient's means allow, a small sick-room refrigerator should be provided, and a tin receptacle for storing foods that do not need to be kept on ice. A gas or alcohol lamp will serve for heating food. A thermometer, a graduate, a funnel, and filter papers are needed, and a meat-mincing machine will be found a useful addition. Saucepans, a dishpan, and a supply of tea towels should also be provided. Boric acid or borax and sodium bicarbonate will help to keep things fresh and clean. In cases of infectious and communicable diseases a covered boiler for disinfecting all dishes and utensils should be added. The dishes should be boiled in water to which 2 or 3 per cent. of sodium bicarbonate has been added, and the boiling should be allowed to continue for fully twenty minutes after the water has begun to boil. If this duty is delegated to someone else and the instruc-

tions are likely to be carelessly followed out, it is best to direct that the dishes be boiled for an hour.

Feeding Unconscious and Refractory Patients. —Unconscious patients may often easily be fed by means of a teaspoon. Each spoonful should be swallowed before a second is given. In the case of comatose children, the nourishment may be poured into the nostril instead of into the mouth. The fluid thus given is swallowed, and any excess returned by the other nostril. If any difficulty is experienced in swallowing, it is best to resort either to the stomach or the nasal tube. This is usually done by the physician himself. With a little practice most patients can be fed with the tube more easily than in any other way. A mouth-gag should be introduced, or a roller bandage may be placed between the teeth and held in place by an assistant. In infants who have no teeth this precaution is unnecessary, as the finger answers the purpose perfectly. The tube, previously moistened, is passed into the pharynx and rapidly into the stomach. If the tube is not passed rapidly through the pharynx, contraction may follow and the tube be prevented from entering the esophagus. In order to pass the tube into the esophagus, it is necessary to hold it sufficiently well back from the end.

If **nasal feeding** is to be used, a nasal tube, or in case of infants a catheter, is well oiled and gently passed through the nose into the esophagus and then into the stomach. Care should be taken not to pass the tube into the larynx. This accident can always be avoided by waiting a moment before pouring in the food. Either stomach or nasal tube should be provided with a funnel, and as soon as the tube has been satisfactorily introduced, the nourishment—milk, milk and egg, or

whatever liquid food is desired—may be poured slowly into it.

In order to prevent air from entering in advance of the food, a small quantity of the food may be poured down the side of the funnel until the tube is full. In many cases it may be desirable to wash out the stomach before introducing the food. The tube should be withdrawn rapidly, so as not to excite vomiting. Food so introduced may be retained when it would otherwise be vomited. This is true both of infants and adults.

Forced Feeding.—In case of refractory patients—the insane, the hysteric, and others who refuse to eat—forced feeding becomes necessary. In this case enough attendants should be present to control the patient. He should be held firmly and the nasal or stomach tube may be introduced. In order to prevent regurgitation of the food, which some patients manage to do quite skilfully while it is being introduced, the ribs may be tickled. This prevents fixation of the diaphragm, without which the food can not be ejected. This should be done only when occasion demands.

FEEDING IN FEVER.

In fever the changes taking place in the body are increased, while the amount of food assimilated is decreased. For this reason, even if the patient is well fed, a certain amount of the body substance is burnt up. If the patient is poorly fed or the fever protracted the emaciation may be extreme. The appetite is diminished or lost entirely, and it may require great tact on the part of the nurse to see that the patient takes sufficient food. The thirst is increased.

Foods appropriate for healthy individuals are not, as

a rule, suited for fever patients, and solid foods usually cause vomiting or severe indigestion. In order properly to nourish a fever patient, it is necessary that the food be easy to take, easy to digest, and easy to assimilate. Any food that does not possess these three qualities is not suitable for a fever patient. When the disease runs its course rapidly, the diet is of no great importance, for even if the patient take but little food, the period of comparative fasting is a brief one and any loss is easily made up while recovery is in progress. In protracted diseases, on the other hand, such as typhoid fever, and in chronic fevers, the diet is of primary importance. In chronic diseases and in those fevers where remissions occur, the periods when digestion is comparatively good should be taken advantage of and the patient nourished and strengthened as much as possible.

In fevers the mouth requires especial care; the bowels likewise should be regulated and constipation avoided.

Suitable beverages should be given to allay thirst, and if the patient is not getting sufficient liquid with his food he should be offered water or some other drink every three or four hours. This should be done whether or not the patient is conscious, for a patient seemingly conscious is often in an apathetic condition. The water is required not only to quench thirst, but to aid in the elimination of waste products, which, owing to the increased metabolism, are augmented. The most suitable of all drinks is plain water. When this does not agree, or to meet special indications, mineral waters are often of great use. The natural waters, since they do not contain such large amounts of carbon dioxid, are best. If the artificial waters are used—and this is generally the case—they should be allowed partially to effervesce

before being given to the patient, lest the gas in the stomach cause unpleasant symptoms. The "Imperial Drink" (see Recipes) is very useful and is generally taken with a relish. To this may be added the white of an egg, beaten up and strained, if the patient is not taking much food. Both lemonade and orangeade are useful, and the former is particularly valuable. Since the hydrochloric acid of the stomach is deficient during fevers, water acidulated with hydrochloric or phosphoric acid is of service, as it increases the powers of digestion. Barley water, oatmeal water, toast water, and albumin water are all of service, containing, as they do, nourishment with drink. Albumin water is made by beating up the white of a fresh egg, straining it through a cloth, and then adding six or eight ounces of water. This may be flavored with lemon, orange, sherry, or cognac. Wine whey is also of value, and under certain circumstances, as in affections of the bladder, flaxseed tea or gum water may be given. Rarely, beer or some other beverage is permissible. To those accustomed to taking large quantities of beer daily this may be the only means of getting the patient to take nourishment.

The food for fever cases should always be liquid. Milk, as it contains various food elements in a suitable combination, is the best of this class of foods, and if properly administered agrees with most patients and is easily digested. It should, as a rule, be diluted, and a small quantity of lime water or sodium bicarbonate should be added to it. Lime water may be added in amounts varying from 5 to 50 per cent., according to circumstances. Vichy or Seltzer water, or even ordinary water, may be used, and may be flavored if the patient prefers. Barley water or oatmeal water may be mixed

with it, or, what is sometimes of great service, equal parts of a cereal water and milk may be boiled together. If the mixtures mentioned do not agree the milk should be peptonized. Milk should not, however, be peptonized if the patient can take and digest it without peptonization. Buttermilk, kumiss, or whey may also be used. Buttermilk, however, contains less nourishment than milk; kumiss may not be relished at first, but many patients soon learn to like it. Lastly, infants' and invalids' food may be given. Malted milk may be enjoyed by the patient, and is useful in those cases in which there is diarrhea.

Eggs may be given raw or in the form of albumin water, and an excellent mode of administration, especially if the patient requires a stimulant at the same time, is to give the time-honored Stokes' brandy-and-egg mixture. Given in this form the egg generally agrees. It may be well to make up the mixture with one-quarter or one-half the amount of brandy.

Meat juices and broths, for which recipes will be given further on, may be used. The meat extracts are best given well diluted. The variety of broth should be changed each day, using beef, veal, mutton, and chicken in turn, to avoid monotony in the diet. The various predigested beef preparations and beef juices sold in the shops may be used at times, and are often of great value, especially when the patient can not retain other forms of food. Strained vegetable broths are useful occasionally in long-continued fevers, and gelatin preparations, such as calves'-foot jelly, wine jelly, or fruit jelly made with gelatin, may also be employed. Fruit juices, especially lemon, orange, and raspberry juices, are generally relished. These should be diluted, and are

best given cold or with cracked ice. Solutions of grape sugar alone or drink sweetened with grape sugar are to be recommended. Granulated extract of malt dissolved in water or milk is relished by some patients.

The question as to the value of alcohol in fevers is one that has been widely discussed. While alcohol has doubtless been greatly abused, it is of value both as a food and as a stimulant. The quantity to be given and the question whether it is to be given or not are to be decided only by the physician. Both questions depend upon circumstances, and the age, condition, habits, and tolerance of the patient all play an important part in deciding this question. It is usually prescribed in small doses at regular intervals, and should, if the stronger forms are used, be sufficiently diluted with water.

CHAPTER X.

FEEDING IN THE INFECTIOUS DISEASES.

TYPHOID FEVER.

THE management of the diet in typhoid fever is one of the most important things for a nurse to know. The diet to be followed is ordered by the physician, but it will depend upon the nurse to see that his orders in this respect are carried out in an exact and intelligent manner. Whether the patient will get sufficient food or not frequently depends on the tact and attention of the nurse.

In this disease there is a diminution of the digestive and absorptive powers. The digestive juices are less active and the functions of the liver more or less disturbed. In addition there are ulcerations in the intestine, which may go on to perforation. During fever the metabolism is increased, and unless sufficient food is taken and assimilated the body protein will be used up and emaciation result. This always occurs to some extent in all cases, no matter what the food, and severe emaciation may also occur in well-fed cases from other causes. It should be borne in mind that a mild case of typhoid fever should be dieted with the same care as a severe one.

Food and drink should be given at regular intervals, both by night and by day; the appetite of the patient should not be consulted, for these patients are often apathetic or have no desire for food. The food should

be given at intervals of from two to four hours, according to the condition of the patient and the quantity taken at a time. Those who are strong and in comparatively good condition may take their nourishment at four-hour intervals during the night, even if it is given at more frequent intervals during the day.

The **question of drink** is also of great importance in these cases, for in some patients severe thirst is a very disagreeable symptom to combat. Pure water, given with or without ice, is to be depended upon, but if there are no contra-indications this may be varied in many ways. The natural spring waters, or if these can not be obtained the artificial ones, are often useful. The artificial waters contain large quantities of carbon dioxid, and to avoid trouble they should always be allowed partially to effervesce before they are given to the patient. If there is no marked bowel disturbance, fruit juice may be added to the water. Lemonade, orangeade, raspberry juice, and raspberry vinegar and water are often welcome changes. Weak tea, especially if a little red wine is added to it, is an admirable thirst quencher. Cold weak coffee is relished by some. Red wine and water, white wines, or even sherry or brandy and water may be given to some patients, especially if plain water causes unpleasant symptoms. When there is irritability of the intestine or severe diarrhea, red wine and weak tea are to be preferred. Albumin water, since it combines food and drink, is most useful. It may be flavored with lemon or orange juice, or may be shaken up with a little sherry or brandy and ice. (The egg, which should always be perfectly fresh, should be beaten and then strained through a cloth.) The various mucilaginous drinks may be used, but are not generally relished. Gum-arabic

water, arrowroot water, bread water, barley water, oatmeal water, and similar beverages have their place in the physician's list of possibilities.

Milk.—The food par excellence in this disease is milk. There is no one food that meets so many indications. It possesses great nutritive value, is easily procured, as a rule, and is generally easily administered. It must be borne in mind, however, that there are some patients with whom milk disagrees, and many who do not like it. Milk, however, disagrees less commonly than is generally imagined. The amount to be given daily varies between one and three quarts, according to the patient. There are not many patients who can take three quarts of plain milk, and it is generally a good plan to vary its form of administration, and occasionally to substitute for it other articles, which will be mentioned further on, so that the patient may continue to take milk during the entire course of the disease. If milk is given plain, it is only a question of time when it will disagree with any patient. Children are more apt to take it over long periods of time than are adults. At the Garrett Hospital for Children in Baltimore the authors seldom use anything besides milk for typhoid cases, and do not find it necessary to make changes in it. For older children or adults it should always be modified. When milk forms the diet, the mouth requires particular care, as the little milk that remains in the mouth often turns the patient against the next feeding.

There are many ways of *modifying milk* and rendering it more agreeable and more digestible to the patient. The simplest method is to add from one to three ounces of lime water to each glass of milk, or plain water or a mineral water may be used instead. If milk is well borne

and it is desired to increase the amount of nutriment, cream may be added to it. If this causes unpleasant symptoms it should be discontinued at once. Buttermilk may be given occasionally, but is far inferior in nutritive value to plain milk. Kumiss or kefir may be used, and while they may not be relished at first, most patients learn to enjoy them. A pinch of salt may render milk more palatable to some persons, and the addition of a spoonful of brandy may be relished by others. The milk may be given cold, be flavored with fruit juices, vanilla, or nutmeg, or it may be given in the form of ice cream. When milk is not well borne, it is a good plan to prepare barley water and add to it an equal quantity of milk, boiling them together for a few minutes. Plain boiled milk may also be used with benefit.

Among the disagreeable symptoms to which milk gives rise may be mentioned a bad taste in the mouth, which, however, is apt to be present in any case; a sense of fulness or pressure in the abdomen; eructation; or even pyrosis. When the milk is not well digested it may cause diarrhea, with colicky pains, and the undigested curds will be found in the stools. To obviate these symptoms the measures previously suggested may be tried (see also Milk Cures). Malted milk may be used, or the milk may be mixed with some of the invalid foods, or it may be partially or completely peptonized. For the last purpose the peptogenic milk powder will be found useful.

When milk is found to disagree, other forms of nutriment must be given. If care is taken to supplement its use by other foods from the beginning, the milk will be less apt to cause disturbance.

The **carbohydrates** are valuable foods in typhoid and may be used in many different forms. Of these,

the various gruels are the most easily digested, and may be given plain or mixed with milk or bouillon. Oatmeal, thoroughly cooked (three hours' boiling at least) and strained, is best, but may not agree with the patient. Barley water (Robinson's barley flour is an excellent preparation for making barley water), arrowroot, sago, tapioca, and the prepared foods may all be used. In Germany aleuronaut flour is added to bouillon or soups.

Of the **proteins** and allied substances there are a number that may be used. Meat is to be forbidden so long as fever occurs. Fat must be skimmed from soups, broths, and bouillon, as it is apt to disturb the patient's digestion. Beef juice made according to any of the recipes given in the Appendix may be used, or beef juice expressed from very slightly broiled beef or skimmed dish gravy may be used. This may be served in a green glass if the color of the juice is objectionable. Bottle bouillon may be employed, as may also the various liquid beef preparations and meat juices now on the market. Mosquera Meat Jelly and Valentine's Beef Juice are useful but expensive. Beef extracts are more stimulating than nutritious.

Senator recommends gelatinous substances, such as gelatin, calves'-foot jelly, bottle bouillon, and the like. Oysters may be served with gelatin. The gelatin jellies may be flavored with fruit juices or with wine.

Eggs should be used sparingly. Egg water, however, when properly prepared, rarely causes distress. Raw eggs may occasionally be given, or the yolk of an egg in bouillon or broth. Eggs and milk together may cause indigestion; but if the patient is in need of a stimulant as well as a food, Stokes' brandy-and-egg mixture may be used, and in moderate quantities rarely disagrees.

Somatose, eucasin, nutrose, and similar preparations may be mixed with bouillon or other foods.

Alcohol holds an important place as a food as well as a stimulant in long-continued fevers. The tendency to-day is to prescribe it in smaller quantities than formerly, and many have abandoned its use altogether. It is, nevertheless, a valuable ally in fighting typhoid, and should not be discarded. It is not given to children as a routine treatment, but even in young patients it is often of the greatest service. When given to adults, it is well to begin with very small doses and to increase these as the patient grows weaker or as the fever continues to progress. Too much should not, however, be given; and if the dosage has been too large at first, it can not be increased as needed later on. In habitués, alcohol will be needed from the outset.

The form of alcohol to be used is largely dependent on the patient's taste. As a rule, good old whisky, properly diluted, is best. Old brandy is good, but much of the brandy sold is of very inferior quality. The red wines are useful, especially when there is diarrhea, and the old white wines are excellent if the patient cares for them. The brandy-and-egg mixture previously mentioned is very useful.

High Caloric Diets.—Of recent years there has been a tendency to increase the amount of food given typhoid fever patients, and for this purpose a considerable choice of foods is desirable. The following are the most suitable:

Milk.	Kumiss.
Cream.	Cocoa.
Buttermilk.	Chocolate.
Whey.	Ice cream.
Junket.	Malted milk.
Matzoon.	

Soups.—Beef, veal, chicken, tomato, potato, etc. These may be thickened with rice, barley, arrowroot, wheat flour, or with egg or milk. Well-boiled rice, sago, or barley may also be used.

Raw eggs.	Stokes' brandy and egg mixture.
White of egg.	Egg-nog.
Yolk of egg.	Milk toast.
Custards.	Crackers and milk.
Egg and milk.	

Well-cooked cereals, such as rice, barley, cream of wheat, sago, arrowroot, cornmeal.

Soft puddings.
Blanc mange.
Cornstarch pudding and similar preparations.
Thoroughly cooked macaroni and spaghetti.
Apple-sauce, lemonade, orangeade.
Gelatin jellies.

Scraped meat, raw or boiled, given with care and only in small amounts.

Oatmeal is ordinarily not suited as a food for typhoid fever patients, but sometimes is used. It should be cooked five hours and strained.

Pea-soup and bean-soup have been suggested, but ordinarily are objectionable on two grounds—the purin nitrogen contained and their great tendency to cause flatulence in some patients.

Baked or mashed potatoes may be used sparingly.

If the patient is sufficiently well, a considerable amount of food may be given; but it should be borne in mind that any food that disagrees should be discontinued, lest the disturbance so caused should interfere seriously with the future feeding of the patient.

The following diets will be found useful as suggestions of what has been used successfully in feeding typhoid fever patients with large amounts of food. The physician should prescribe the diet and be consulted concerning any changes in the diet and the amount of food given:

Coleman's Milk, Cream, and Lactose Diets.

For 1000 calories a day:

	Calories.
Milk, 1 quart (1000 c.c.)	700
Cream, 1⅔ ounces (50 c.c.)	100
Lactose, 1⅔ ounces (50 gm.)	200

This furnishes eight feedings, each containing:

Milk, 4 ounces	80
Cream, 2 drams	15
Lactose, 6 grams	24

For 1500 calories a day:

Milk, 1½ quarts (1500 c.c.)	1000
Cream, 1⅔ ounces	100
Lactose, 3⅓ ounces (100 Gm.)	400

This furnishes six feedings, each containing:

Milk, 8 ounces	160
Cream, 2 drams	15
Lactose, 16 grams	64

For 2000 calories a day:

Milk, 1½ quarts	1000
Cream, 8 ounces (240 c.c.)	500
Lactose, 4 ounces (125 gm.)	500

This furnishes seven feedings, each containing:

Milk, 7 ounces	140
Cream, 1 ounce	60
Lactose, 18 grams	72

For 2500 calories a day:

Milk, 1½ quarts	1000
Cream, 8 ounces	500
Lactose, 8 ounces (250 gm.)	1000

This furnishes seven feedings, each containing:

Milk, 7 ounces	140
Cream, 1 ounce	60
Lactose, 36 grams	144

For 3000 calories a day:

Milk, 1½ quarts	1000
Cream, 1 pint (480 c.c.)	1000
Lactose, 8 ounces	1000

This furnishes eight feedings, each containing:

Milk, 6 ounces	120
Cream, 2 ounces	120
Lactose, 1 ounce (30 gm.)	120

This furnishes eight feedings, each containing:

Milk, 6 ounces	120
Cream, 2 ounces	120
Lactose, 2 ounces	120

Coleman suggests the following diet:

	Hours.		Total calories.
Milk, 6 ounces	9, 11 A. M.; 3, 7 P. M.	1200 c.c.	860
Cream, 2 ounces	10 P. M.; 1, 4 A. M.	420 c.c.	840
Lactose, 10 grams		70 gm.	280
			1980

		Calories.
At 11 A. M.:	Egg, 1	80
	Mashed potato, 20 gm.	20
	Custard, 4 ounces	250
	Toast (or bread), 1 slice	80
	Butter, 20 gm.	150
	Coffee.	
	Cream, 2 ounces	120
	Lactose, 20 gm.	80
		780

		Calories.
At 5 P. M.:	Egg, 1	80
	Cereal, 3 tablespoonfuls	150
	Cream, 2 ounces	120
	Applesauce, 1 ounce	30
	Tea.	
	Cream, 3 ounces	180
	Lactose, 20 gm.	80
		640

		Calories.
At 7 A. M.:	Egg, 1	80
	Toast, 1 slice	80
	Butter, 20 gm.	150
	Coffee.	
	Cream, 2 ounces	120
	Lactose, 2 gm.	80
		510

The following contains 5580 calories:

	Hours.		Total Calories.
Milk, 5 ounces	9, 11 A. M.; 3, 7 P. M.	1200 c.c.	820
Cream, 2 ounces	10 P. M.; 1, 4 A. M.	720 c.c.	1440
Lactose, 15 gm.		120 gm.	480
			2740

		Calories.
At 11 A. M.:	Eggs, 2	160
	Toast, 2 slices	160
	Butter, 20 gm.	150
	Mashed potato, 70 gm.	70
	Custard, 8 ounces	500
		1040

		Calories.
At 5 P. M.:	Egg, 1 slice	80
	Toast, 2 slices	160
	Butter, 20 gm.	150
	Cereal, 6 tablespoonfuls	290
	Cream, 4 ounces	240
	Applesauce, 1 ounce	30
	Tea.	
	Cream, 2 ounces	120
	Lactose, 20 gm.	80
		1150

		Calories.
At 7 A. M.:	Egg, 1	80
	Toast, 2 slices	160
	Butter, 20 gm.	150
	Coffee.	
	Cream, 3 ounces	180
	Lactose, 20 gm.	80
		650

The following diet contains 5570 calories, and is suitable for convalescents:

	Hours.		Total Calories.
Milk, 5 ounces	9, 11 A. M.; 1, 7 P. M.	1050 c.c.	700
Cream, 3 ounces	10 P. M.; 1, 4 A. M.	630 c.c.	1260
Lactose, 15 gm.		105 gm.	420
			2380

		Calories.
At 11 A. M.:	Eggs, 2	160
	Mashed potato, 80 gm.	80
	Custard, 8 ounces	500
	Creamed chicken, 1 ounce	50
	Toast, 2 slices	160
	Butter, 20 gm.	150
		1100

		Calories.
At 5 P. M.:	Toast, 2 slices	160
	Cereal, 6 tablespoonfuls	290
	Cream, 2 ounces	120
	Lactose, 20 gm.	80
		650

		Calories.
At 3 P. M.:	Lemonade (lactose, 120 gm.)	480

		Calories.
At 7 P. M.:	Egg, 1	80
	Cereal, 5 tablespoonfuls	250
	Cream, 2 ounces	120
	Toast, 2 slices	160
	Butter, 20 gm.	150
	Coffee.	
	Cream, 2 ounces	120
	Lactose, 20 gm.	80
		960

The following valuable recipes were arranged by Miss Edna Cutler, and are from Coleman's article:

Cocoa with milk.

	Calories.
1 rounding teaspoonful of cocoa	50
2 ounces of milk sugar	240
4 ounces of milk	80
2 ounces of cream	120
	490

Mix the sugar and cocoa; cook in the milk until dissolved. Serve with the cream.

Cocoa:

	Calories.
1 heaping teaspoonful of cocoa	50
2 ounces of milk-sugar	240
½ cup of water.	
3 ounces of cream	180
	470

Mix the cocoa and sugar, add the water, and boil. Then add the cream, or use less cream and serve with whipped cream.

Coffee:

	Calories.
1½ ounces of milk-sugar	180
4 to 5 ounces of strong coffee.	
2 ounces of cream	120
	300

Plain junket or rennet custard:

	Calories.
25 gm. (1 ounce) of milk-sugar	100
5 ounces of milk	100
¼ junket tablet.	
1 ounce of cold water.	
Few drops of vanilla.	
	200

(See directions for cocoa junket.)

Cocoa junket:

	Calories.
1 teaspoonful of cocoa	50
25 gm. of milk-sugar	100
5 ounces of milk	100
¼ junket tablet dissolved in 1 ounce of cold water.	
	250

Mix the cocoa and sugar, add the milk, and heat lukewarm, stirring constantly; add the dissolved junket, stir thoroughly, and leave it in a cool place to set.

Soft custard:

	Calories.
1 cup of milk	160
1 egg	80
2 ounces of milk-sugar	240
Speck of salt.	
2 to 3 drops of vanilla, or caramel made of 3 tablespoonfuls of granulated sugar	20
	500

Beat the egg slightly, and the sugar, salt, and hot milk slowly. Cook in a double boiler, stirring constantly until it thickens a little (if cooked too long the custard will curdle, but may become smooth again if set in a dish of cold water and beaten at once). Flavor and cool.

To make caramel: Put the sugar in a pan directly over heat and burn until a very dark brown. Dissolve in hot water or milk.

Baked custard:

	Calories.
1½ ounces of milk-sugar	160
6 ounces of milk	120
1 egg	80
Nutmeg or vanilla.	
Speck of salt.	
	360

Beat the egg slightly. Warm the sugar and milk, stirring constantly, add to the egg, strain into a custard cup, and flavor. Bake in a pan of water in a moderate oven

until a knife when cut into it will come out clean (thirty minutes to one hour).

Bread pudding:

	Calories.
1½ ounces of milk-sugar	180
6 ounces of milk	120
1 egg	80
1 slice of bread (⅜-inch thick)	60
½ ounce of butter	120
	560

Spread the bread with butter and cut into squares. Beat the egg slightly; heat the milk and sugar, stirring constantly; mix with the egg and pour over the bread. Grate nutmeg over the top and bake the same as the custard.

Vanilla ice-cream:

	Calories.
4 ounces of cream	240
2 ounces of milk	40
2 ounces of milk-sugar	240
Speck of salt.	
Few drops of vanilla.	
	520

Mix the cream, the milk, the sugar, and heat, stirring constantly, until the sugar is dissolved. Then flavor, cool, and freeze.

Lemonade:

	Calories.
4 ounces of milk-sugar	480
7 ounces of cold water.	
2 tablespoonfuls of lemon-juice (or to taste).	
	480

Boil the sugar and water for two minutes, add lemon-juice to taste, strain, and cool.

Care of the Mouth.—This is of primary importance. If begun early and persisted in, many undesirable mouth conditions can be avoided. If the mouth is in good condition the patient can, as a rule, take his food easily;

if it is not, the greatest difficulty may be experienced. After each feeding the mouth should be cleansed carefully, a proceeding that should never be neglected. If the patient is strong enough he may rinse the mouth with a mild antiseptic solution. Boric acid solutions to which a little glycerin and lemon juice have been added, or one of the prepared mouth washes diluted with water, may be used; diluted oxygen peroxid is also serviceable. If the patient is too weak to do this, the nurse should swab the mouth.

Diet in Digestive Disturbances.—In cases where the food is rejected or badly borne it is necessary to give the stomach absolute rest for several hours or more. Then very small quantities of egg water, barley water and lemon juice, or similar preparations may be given. Panopeptone and the liquid beef preparations are useful in this condition, and may be served with cracked ice or diluted with water. Weak tea or red wine and water in small doses are useful, especially if there is diarrhea.

For the diarrhea an ice-bag to the abdomen has been highly recommended, but is seldom well borne. Instead, cloths moistened with cold water may be used.

For the painful and troublesome accumulation of gas in the intestine, either the ice-bag or the cold applications may prove beneficial. The authors have obtained excellent results from the use of turpentine stupes. When the meteorism is due to the imperfect digestion of starch, the carbohydrates should be reduced or withdrawn; when it is due to milk, the form in which this is given should be changed or it should be withdrawn altogether for a time.

Hemorrhage.—When hemorrhage from the bowel occurs the intestinal tract should be given absolute rest

for a number of hours. An ice-bag, cold applications, or a cold-water coil should be placed upon the abdomen. To relieve the thirst the patient may be allowed to suck small bits of ice, or ice-cold water or cold tea may be given in spoonful doses. After some hours the patient may be given a teaspoonful of cold milk, and this may be repeated every two or three hours. Beyond this, if the bleeding is severe, the intestinal tract should be given complete rest for twenty-four hours or longer. In addition the physician may order opium or morphin. The return to the regular fever diet should be made gradually and with caution.

Perforation.—When perforation of the bowel occurs all food should be discontinued. The patients are usually operated upon as soon as possible or the patient is given anodynes. Following operation, the diet will be that of any bowel perforation that has been operated upon. If the patient rallies without surgical intervention, or when this has been found impracticable, food may be given after an interval of twenty-four hours, but only in very small quantities at sufficiently wide intervals. It is best to begin with teaspoonful doses every three hours, and if the food is retained this may gradually be increased. Usually food is rejected, and when this is the case the stomach should be given complete rest, for feeding only tends to aggravate the condition.

Convalescence.—The diet during the first weeks of convalescence requires as much care and attention as it received throughout the febrile period; in fact, since these patients often develop a ravenous appetite, born of several weeks' milk diet and fever, even greater care is necessary. The patient's wishes should in nowise govern his diet, and relatives and friends should be cautioned against giving the patient anything not ordered by the

physician. Many a relapse and death has been caused by the misguided kindness of friends and relatives in this respect.

When there has been severe bowel disturbance, the patient is to be kept on a liquid diet until the ninth or tenth day of the afebrile period. After mild cases, where there has been but little bowel disturbance, changes may be made in the diet after the fifth or sixth afebrile day. In these mild cases the greatest caution is required, as they are often quite as apt to do badly as are the severe ones, and the attendants are much more likely to be careless in carrying out instructions.

The first addition to the dietary should be made by giving a piece of zwieback over which hot milk or cream has been poured. If desired, milk toast, milk and crackers, or junket may be substituted for this. If this is well borne, other articles, such as soft-boiled eggs, or the soft part of oysters, if they are in season and can be obtained fresh, may be added from day to day. Thickened meat broths containing well-boiled rice or vermicelli may be given. Finely scraped raw beef, reduced to a pulp in the manner suggested for tuberculosis patients, also lends variety.

Tender meats, vegetables, and breadstuffs in increasing quantities may be allowed. Roast chicken, squab, or partridge, boiled (white) fish, such as trout; of the vegetables, spinach, cauliflower tops, asparagus tips, purées of peas, carrots, or tender string-beans or artichokes, well-cooked rice, and baked potato mashed and served with cream or dish gravy; toast, zwieback, crackers, and the crust of bread may all be permitted. If the condition of the bowel permits, fruit juices may be allowed, as well as a baked apple, apple sauce, or junket flavored with fruit. Other sick-room delicacies may be ordered

at the discretion of the physician. Chops, tender steak, and roast beef may generally be given in the third afebrile week (very finely divided meat may be allowed much earlier), and the diet gradually changed until the ordinary diet is resumed. For some time after an attack of typhoid fever the patient should be instructed to exercise care in the selection of his diet, and especially to avoid all food, such as green fruit, green corn, crabs, and the like, that is likely to cause diarrhea.

The following **menu for the first week of convalescence** may serve as a guide and may be altered to suit the individual case. It may be begun about the fifth or sixth afebrile day in mild cases, and about the ninth or tenth in severe cases. Milk should form the bulk of the diet at this period.

First Day.—Milk toast, or zwieback covered with hot milk or cream, or crackers and milk; beef juice.

Second Day.—Chicken broth thickened with rice or vermicelli (the rice should be boiled thoroughly); soft parts of several oysters, or a very lightly boiled egg.

Third Day.—Junket; a meat broth thickened with well-cooked barley (boiled at least three hours), with barley flour, or with stale bread crumbs; wine jelly; scraped raw beef.

Fourth Day.—Lightly boiled or poached egg; arrowroot, barley gruel, or milk toast; chicken jelly.

Fifth Day.—Junket; a little well-boiled rice with a small amount of finely divided roast chicken, squab, or partridge, preferably the white meat; apple sauce if bowels permit.

Sixth Day.—Scraped beef; poached egg; calves'-foot jelly; baked custard; piece of toast or zwieback.

Seventh Day.—A small piece of finely divided broiled chop or steak; baked potato; baked apple; well-boiled rice and cream for breakfast; junket for supper.

Atypical and Complicated Typhoid.—In these forms the physician often departs from the usual course of diet and orders a diet to meet the special indications.

TYPHUS FEVER.

The diet is that of all fevers and requires no especial precautions. Milk is the main stay, and a quart of milk and a pint of broth may be regarded as a fair daily allowance. Eggs are better borne than in typhoid and may be allowed. Rolls, zwieback, and chopped meat are allowed by some physicians even while there is fever. Black coffee is useful if there is stupor. Water should be given freely.

SMALL-POX.

The usual fever diet is used. Owing to the great drains on the patient's system when the stage of suppuration is going on, it is desirable that the patient be fed up as much as possible during the stage of remission of the fever. If there is much pain on swallowing, and there often is, the food may be given cold.

SCARLET FEVER.

One of the chief dangers of scarlet fever is inflammation of the kidneys, and the diet should therefore be bland and unirritating. A milk diet, continued for a month, is perhaps the safest but difficult to carry out, and we have recently been more liberal, allowing farinaceous foods, and, in fact, almost any purin free food may be allowed,

taking care not to give those things which are known to be irritating to the kidneys. (See Diet in Nephritis and Purin Metabolism.) The various modifications of milk may be used. Kumiss and buttermilk are of especial value in some cases, and oyster and clam broth, from which the shellfish have been removed, may be given. For the thirst, which is generally great, plain or carbonated waters, barley water, orangeade, or lemonade may be given freely. A level teaspoonful of cream of tartar mixed into a glass of lemonade is a diuretic drink if albuminuria is present. If edema is present, the physician generally orders a restriction of the fluid, and salt is generally omitted from the diet. Plain vanilla ice-cream or plain lemon-juice may be given in small quantities. Finely shaved ice, also in very small quantities and flavored with a little lemon or orange-juice, often makes a great addition if angina is marked. Cereal gruels, with or without milk, are very useful, and well-cooked cereals, with the exception of oatmeal, about which there is still some question, milk toast and milk, or crackers and milk, are very useful. Useful puddings made of cereals and milk are also of service. Fruit may be given in moderation, its juice being perhaps the best to use, grape-juice and apples, or, if there is constipation, stewed prunes may also be used to advantage. In all cases the return to a general diet should be made gradually, starting with eggs and dishes made out of eggs, and adding from day to day boiled or baked fish, the soft parts of oysters, the lightest and most easily digested meats, the white meat of chicken and raw or very rare beef, and gradually the general diet. During the height of the disease and throughout convalescence meat extracts should be avoided, as they contain large quantities of extracts which are liable to irritate the kidneys.

MEASLES.

The diet is that of any fever. No especial precautions need be observed.

MUMPS.

Liquid diet should be given while the fever and swelling exist. Acids and astringents should be avoided on account of the intense pain they are liable to cause.

WHOOPING-COUGH.

The diet requires close attention, especially if the case is severe. Mild cases should be given a light general diet. If the case is severe a liquid diet should be given, and this should consist largely of milk. The great difficulty is that the food is liable to be vomited at the close of the paroxysms. This may occur so frequently that the child has difficulty in retaining sufficient food to nourish it. A good plan is to give another meal in place of the one which has been vomited, as soon as the child is able to take it.

DIPHTHERIA.

Egg-nog and milk punch are sometimes useful, although, as a rule, stimulants are best given alone and not combined with the food.

If the patient can not swallow, nutrient enemata may be resorted to; a nasal or a stomach tube may be employed. If the latter mode of feeding is adopted, care should be taken to avoid struggles with patients whose hearts are weak.

In all cases, if there is any fever, the food should be liquid and should be given in small quantities at regular intervals. The most useful of the liquid foods are milk, plain, with lime water or a carbonated water, or peptonized albumin water; some form of predigested beef,

liquid beef peptonoids or panopeptone; soups and gruels, and the various prepared foods, of which malted milk, Eskay's or Mellin's foods are examples.

Occasionally semi-solids are swallowed with greater ease than liquids; in this case any of the foods just mentioned may be thickened with well-cooked cereals or gelatin, or custards or junket may be given. Ice cream, if plain, may be allowed in moderate quantities.

Intubation.—After intubation has been done there may or may not be some difficulty in swallowing. As a rule, when the child swallows for the first time there may be a slight cough or some hesitation; in the majority of cases, however, this disappears as the apprehension of the child is allayed. There may be a little difficulty for the first day, but this passes off gradually as the muscles become accustomed to work under the new conditions.

If the child is old enough he should be instructed to take the food as rapidly as possible and then to cough afterward, instead of after each act of deglutition, as he is apt to do. In some children there may be a slight regurgitation through the nose. Taken all in all, the difficulty experienced in feeding these cases is small compared to the enormous benefit the child derives from the operation.

If there is difficulty in swallowing liquids, solid or semi-solid food may be given instead. The child may be placed with his head lower than his body. In this position swallowing becomes easy. The child may also lie across the nurse's lap, with his head thrown well back and down. It should always be remembered that food may be refused because of nausea, or because the child has no desire to take anything, as well as owing to any actual difficulty in swallowing.

The diet should be the same as in non-operative cases, and if semi-solids or solids are required, soft-boiled eggs, milk toast, custards, bread and milk, oatmeal porridge, and similar foods may be given.

If swallowing becomes impossible, an event that occurs very rarely, the child may be fed with the stomach or nasal tube or by means of nutrient enemata.

No especial dietetic rules are necessary for feeding tracheotomy cases.

Postdiphtheric Paralysis.—In paralysis of the muscles of deglutition which may occur after diphtheria, most of the food may return through the nose; or if the muscles of the tongue as well as the soft palate are invoved, deglutition becomes impossible. When this occurs, the child must be fed with the stomach or nasal tube or by the rectum.

RHEUMATISM.

The diet in this disease is still a matter of dispute. During the acute stage it is best to give milk or a milk and farinaceous diet. Buttermilk, gruels, and the like are useful. A gradual return is made to the customary diet.

YELLOW FEVER.

Food is usually withheld during the first stage of the disease, as it is almost certain to be vomited if given and only aggravates the condition. Stimulants and saline solution and even food may be given by rectal injections. Milk and lime water or albumin water are given during the third day and the diet gradually increased as the physician sees fit. If the patient grows worse everything is vomited.

TETANUS.

Liquid nourishment is given, when possible, between the teeth; if the teeth fit too closely together it is some-

times customary to remove one. A nasal-tube can be used in some cases and a rectal tube in others. When the disease is so severe that the slightest movements about the patient produce convulsions, feeding becomes impossible except while he is under the influence of an anesthetic.

RABIES.

Only those who have seen this terrible disease appreciate the difficulties in feeding these patients. Liquid nourishment may be given so long as the patient can swallow if he desires food. Even the slightest movements near the patient produce spasms, and, as the result is uniformly fatal, it is not necessary to add to the patient's sufferings by trying to feed him.

TUBERCULOSIS.

Diet in tuberculosis is of primary importance. We shall consider only pulmonary tuberculosis, for the same rules apply to all forms.

The weight of the patient is a fair guide as to the state of his nutrition. This should be borne in mind, for in recent years overfeeding in tuberculosis has been somewhat overdone. In addition to the food it is essential that the patient should have an abundance of fresh air, carefully regulated hours for rest and exercise, and the whole life must be so ordered as to secure as great freedom from care and worry as is possible. In addition to the full night's rest it is a good plan for the patient to lie down at least half an hour after each meal.

The individual requirements of the patients differ greatly, and food, rest, and exercise must be suited to the individual. The food is to be chosen from the articles

mentioned below, although other things may be given. It should be made as attractive as possible, and Detweiler was fond of saying, " My kitchen is my pharmacy." The food should be ready at the time the meal is served, and the service should be prompt, so that the patient is not tired out waiting between courses, and also that he does not lose his appetite and patience. The plate should not be piled full of food which the patient is expected to eat, but smaller and repeated helpings have been found to be better. Congenial table companions are a great stimulus to eating, and many patients eat fairly well if seated with others who are cheerful and have good appetites. As a rule, the food should be taken in as concentrated a form as possible, as individuals with weak stomachs may have digestive troubles started if the bulk is too great. This is not so important in working people, as their diet is ordinarily rather bulky; in fact, if some people, accustomed to bulky diet, are given the same food value in a more concentrated form, they claim it does not satisfy their hunger.

The dinner may be taken in the middle of the day if desired, and the rather lighter meal taken as supper in the evening.

Milk.—This is one of the most important articles of diet for the tuberculous patient. Unless some special reason exists, milk should always form a part of the diet. It may be taken with the meals or be given between the intervals of feeding. It is of the utmost importance that the milk be sipped slowly and not swallowed quickly in large quantities. The milk may be taken plain or may be modified in various ways. Lime-water may be added, with or without the addition of cream; carbon-

ated water may be mixed with it or the milk may be peptonized. Buttermilk or kumiss may be taken if desired.

Eggs, when they can be taken in sufficient quantities, are also of the greatest value. In certain cases, however, they may not be well borne. If the entire egg can not be taken, the whites alone may be given. Egg albumin often renders most efficient service in helping to nourish these patients. The whites of from six to twenty-four eggs beaten up lightly and strained through a cloth may be taken daily. A very small pinch of salt and a little lemon juice or other flavoring substance may be added. Given in this way a large number of eggs can easily be taken and are almost invariably well borne. If the patient can digest the eggs entire they may be very lightly boiled, or, as a change, they may be made into a light omelet or poached. Hard-boiled and fried eggs should not be eaten.

Meat.—Meat of all kinds, if properly prepared, may be eaten; but "high" game, highly seasoned dishes, and twice-cooked meats should be avoided. Beef and mutton are the most suitable varieties. Raw meats, especially raw beef, is given in the form of a finely divided pulp. This is prepared by scraping the meat with a knife, which will result in a mass of shredded meat fiber. This is placed in a mortar and pounded and rubbed with a pestle until quite smooth. It is then pressed gently through a sieve to remove any larger particles. This raw meat pulp is very easily digested and highly nutritious. It may be given in various ways, as spread on sandwiches or given in milk or in warm bouillon. It may be mixed with purées of various kinds

or with vegetables, or, in case of children, with small quantities of preserves. It may be rolled into balls and, so, easily swallowed; or it may be served with an egg, with anchovies, or with pickled herring.

Meat juice is also of great value. This may be prepared according to any of the recipes given in the Appendix, or the juice may be expressed from beef by means of a meat press. Good round-steak should be very slightly broiled, cut into small cubes, and the juice pressed out. With a good press about eight ounces of juice can be extracted from a pound of meat. This should be seasoned, and heated by placing the vessel containing it in warm water. Care should be taken not to heat it too thoroughly, or the albumin will coagulate and the juice be spoiled. Freshly prepared beef juice is always preferable, but when this can not be obtained, liquid beef peptonoids, predigested beef, or Mosquera Beef Meal may be employed.

For patients who can not or will not take raw beef, very rare steak, roast beef, or beef soup should be substituted.

Fish.—Fresh fish, boiled, broiled, or baked, may be allowed. Both oysters and clams from which the hard portion has been removed may be eaten, preferably raw, but they may also be given stewed, roasted, or broiled.

Cereals.—Where these can be digested they are of value. In the early stages of the disease they serve not only as nutriment, but also aid in regulating the bowels, and are usually easily digested. If there is constipation they are of especial value. Oatmeal, wheaten grits, cornmeal mush, and rice and milk are the most suitable forms.

Vegetables.—Any of the easily digested vegetables may be allowed. They should be steamed or cooked with as little water as possible, to avoid dissolving out the salts, which, together with much nutriment, are thrown away with the water.

Wheat.—Wheat or rye bread or a mixture of both may be used. Zwieback is of great value. All hot breads, pastry, and cakes should be avoided.

Fruit.—All fresh and, preferably, ripe fruit may be allowed in moderation. It should be taken the first thing in the morning or as a dessert. Oranges and baked apples are well borne and useful, and grapes, peaches, pears, and other fruit in season may be allowed.

Fats.—In tuberculosis, when fats and oils can be taken and absorbed, the prognosis is always much better than when these can not be tolerated. While they are of the greatest value in treatment, care should be taken not to disturb the patient's digestion by forcing more fatty foods into the dietary than the stomach will tolerate. Most patients, however, soon acquire a dislike for fats of all kinds. They are best given in the form of cream and butter; the yolks of eggs, crisp fat bacon, and olive oil are also useful. Cod-liver oil is really as much a food as a medicine. Either the plain oil or an emulsion may be used, and the doses should be small to begin with and gradually be increased. A common mistake is to administer the oil in excessive quantities. Only perfectly sweet fresh oil is to be used, as rancid or stale oil may disturb the digestion. Its use should be discontinued from time to time. Children bear oil better than adults. If there is a tendency to diarrhea, fats and oils must be used with caution.

Alcohol.—Concerning the use of alcohol in the treatment of tuberculosis, it may be said that, except in the last stages of the disease, it is best avoided.

Patients who are gaining in weight or who are in good condition are better off without alcohol. Those who are going down hill may often take light wine, beer, or well-diluted spirits with advantage. Of the last, well-matured whisky is the best.

Patients with high fever who are in an exhausted condition may be given alcohol freely, following the same rules as were laid down in the general consideration of fevers. In these cases alcohol is given as a food, and is, as a rule, well borne. In these advanced cases pure whisky well diluted is perhaps the best form of alcoholic stimulant, but the patient's taste may be consulted in this respect.

Other Beverages.—The usual beverages may be given in moderation. In chronic tuberculosis cocoa may be taken night and morning with good effect. Tea or coffee may be allowed in small quantities unless they produce unfavorable symptoms. Milk and milk punch, buttermilk, lemonade, or orangeade may be used, and malt extracts are often of benefit.

Number of Meals.—Food may be given from three to six times daily. On rising milk may be taken, or if desired a cup of bouillon instead. If desired a glass of milk may be given early before breakfast, before the patient has got out of bed.

Breakfast.—A glass of milk. This may be flavored with tea or coffee and taken from a coffee cup if desired. If the patient wishes it, an orange or a small amount of some other fruit, an ordinary helping of oatmeal, two soft-boiled or poached eggs, two slices of toast or bread, and half ounce of butter. A small piece of bacon may be

taken with the eggs if desired, or an ordinary helping of meat or fish may be substituted. In the middle of the morning, at 10.30 or 11.30, a glass of milk.

Luncheon.—A glass of milk, a helping of fish or a chop or piece of steak or some meat entree, a slice of bread or toast or a roll, half ounce of butter, a potato or a helping of rice, of hominy, or the equivalent. A green vegetable, as spinach or a lettuce or tomato salad, and a dessert of junket, bread pudding, baked custard, or some similar nutritious dish.

In place of afternoon tea a glass of milk with a few slices of bread and butter.

Dinner.—A glass of milk, a small amount of soup if desired, and if it does not interfere with the appetite, an entree if desired, a good helping of some substantial plain meat, as roast beef, mutton or lamb, or chicken, guinea-hen or turkey, potatoes, or a farinaceous vegetable and a green vegetable, a salad if desired, and dessert and a small piece of cheese.

At Bedtime.—A glass of milk.

The above works out approximately as follows:

Food.	Protein, grams.	Fat, grams.	Carbo-hydrates, grams.
Milk, 3 pints	57	70	87
Cream, 1 ounce	1	6	
Butter, 1½ ounces		32	
Eggs, 2	12	8	
Meat, 6 ounces	44	22	
Fish, 4 ounces	20	10	
Bread, 6 ounces	16	2	88
Cereals, 2 ounces	8	4	40
Potatoes or vegetables, 5 ounces	1		30
Desserts, 4 ounces	9	16	50
Green vegetables, Fruit, Soups, etc.,	1	1	7
	169	171	302

Total in calories, 3480.4.

The milk taken at meal time should be drunk at the end of the meal and not at the beginning, so as not to interfere with the appetite.

If desired or if deemed necessary, a small amount of liquid nourishment may be taken during the night if the patient awakens. As a rule, however, it is well to give the stomach a full night's rest. In severe cases, where only small quantities of liquid or semisolid food are taken, the intervals should be shortened to every two or three hours.

Diets for the poorer classes of people should be so arranged as to be more or less like the diet to which they are accustomed, both in composition and price. This means that the dietary is more bulky, contains more carbohydrates and less fat. The additional protein and carbohydrate and fat can be conveniently and cheaply added in a quart of milk, meat, beans, peas or lentils, and butter. Where price is a very great item, skim milk may be used in part or entirely, and oleomargarin substituted for the butter. Beans, hominy, cornmeal, lentils, dried peas, and similar articles of diet may be used in large quantities, and the cheaper cuts of meat substituted. There is not always any real economy in cheaper cuts of meat, as some of them contain comparatively little nutriment. In cities where there are markets, by purchasing just before the market closes, odds and ends of various cuts may be bought at very low prices and to greater advantage from the standpoint of food value than cheaper cuts.

Feeding Advanced Cases.—In advanced cases patients may generally be permitted to select their diet. These patients can often eat hearty meals with a relish and apparently digest them without difficulty. As a rule,

they must be light, liquid or semi-solid. The same principles may be applied here as in feeding fever cases, with the exception that the patient's desires should, so far as possible, be gratified.

Gastric Irritability.—This is very troublesome in some cases. The patient should be instructed not to swallow his sputum. If the attack is severe, easily digested liquid food should be given. Peptonized milk, kumiss, and the predigested beef preparations are of value. If there be continued irritability and the patient becomes unable to retain his meals, marked relief is frequently afforded by feeding with a stomach tube.

Fever.—Tuberculosis patients with fever should be fed much according to the general rules given for fevers in general. If the digestion is not disturbed and the appetite is good easily digested solid food may be allowed. If the solid food does not agree the patient should be placed upon a liquid diet.

Forced Feeding (Suralimentation). — Débove discovered that food introduced by means of a stomach tube was often retained when it would otherwise be rejected. This method is used in gastric irritability and also where the patient is unable to take sufficient food owing to loss of appetite and disgust for food.

Diet in Sanatoriums.—The following diet list in use at the King Edward VII. Sanatorium gives a very good idea of the average diet used in institutions for the tuberculous :

CHAPTER XI.

DIET IN DISEASES OF THE STOMACH.

IN diseases of the stomach the selection of a proper diet is often of more importance than the choice of drugs. No absolute dietetic regulations can be formulated in this class of diseases, but it is important to regulate the food in conformity with the particular disease with which the patient is affected, and also to consider the individual tastes and peculiarities of the patient; even in the regulation of a diet in any special disease of the stomach, changes are often rendered necessary; these must be made gradually and according to the patient's power to digest the food.

Food is said to be easily digestible when it produces no gastro-intestinal discomfort, is passed from the stomach into the intestine at a normal rate of speed, and is easily absorbed. Under normal conditions the digestibility of foods is easily ascertained, for the functions of the stomach being normal, the effect of the food upon the functions can readily be determined; in the various gastric disturbances, however, this problem is more difficult. In determining the diet for a special gastric disturbance two points must be borne in mind: first, the power to increase the nutrition of the patient; and secondly, the necessity of giving food in a digestible form, so as to lessen the work of the stomach. Leube has devised a scale of the various articles of food, given in the order of their digestibility. This scale forms the basis of the well-known Leube "ulcer diet."

Leube's Diet Scale.—*Diet I.*—If the digestion is very much reduced the following articles of food are most easily digestible: bouillon, meat solution, milk, raw or soft-boiled eggs.

Diet II.—Somewhat less digestible than Diet I. are the following articles of food: boiled calf's brain, boiled thymus, boiled chicken and pigeon. The different forms of meat are enumerated in the order of their digestibility. Gruels, and in the evening milk mushes made with tapioca and white of egg, may also be placed in this list. The majority of patients can digest boiled calves' feet in addition to the various meat foods already enumerated.

Diet III.—If Diet II. is well borne, Diet III. may be given. This consists in adding cooked or raw beef to Diet II. Leube gives the following method of preparing beefsteak, and believes that beef cooked in this way is very easily digested: The meat should be kept for some time and is then scraped with a dull spoon; in this way a pulp is obtained, consisting only of the delicate parts of the muscle, and not containing any of the tough, hard, and sinewy portion. This pulp is roasted in fresh butter. Raw ham is also to be recommended. In addition to meat a small quantity of mashed potatoes may be given, some stale wheat bread, and small amounts of coffee or tea with milk (cautiously).

Diet IV.—This list is so arranged that if the patient can digest the articles of food mentioned under this head for some time he can then begin with his usually accustomed diet: Roast chicken, roast pigeon, venison, partridge, roast beef, medium to raw (particularly cold); veal (from the leg), pickerel, boiled shad (trout, even when young, is very difficult to digest), macaroni, bouillon with rice. Small quantities of wine may be taken one to two hours before eating; gravies are contra-indi-

cated. Young and finely chopped spinach is allowable; other vegetables, such as asparagus, may be tried cautiously, although Leube considers this a risky procedure. After this fourth diet the patients are allowed to take a more liberal diet, but the increase should be gradual. They should refrain from eating vegetables, salads, preserves, and fruits for some time; and when they are resumed a baked apple is the first of these articles to be eaten.

Beaumont's Table.—This shows the mean time of digestion of the different articles of diet—naturally, in the stomach, and artificially, in vials, on a water-bath. The proportion of gastric juice to aliment in artificial digestion was generally calculated at 1 ounce of the former to 1 dram of the latter, the bath being kept as close to the natural temperature—100° F.—as practicable, with frequent agitation.

Mean Time of Chymification.

Articles of diet.	In stomach.		In vials.	
	How prepared.	Time.	How prepared.	Time.
		h. m.		*h. m.*
Rice	Boiled	1 00		
Sago	"	1 45	Boiled	3 15
Tapioca	"	2 00	"	3 20
Barley	"	2 00		
Milk	"	2 00	Boiled	4 15
Milk	Raw	2 15	Raw	4 45
Gelatin	Boiled	2 30	Boiled	4 45
Pig's feet, soused	"	1 00		
Tripe, soused	"	1 00		4 30
Brains, animal	"	1 45	Boiled.	
Venison, steak	Broiled	1 35		
Spinal marrow, animal	Boiled	2 40	Boiled	5 25
Turkey, domesticated	Roasted	2 30		
Turkey, domesticated	Boiled	2 25		
Turkey, wild	Roasted	2 18		
Goose, wild	"	2 30		
Pig, suckling	"	2 30		
Liver, beef, fresh	Broiled	2 00	Cut fine	6 30
Lamb, fresh	"	2 30		
Chicken, full-grown	Fricasseed	2 45		

Mean Time of Chymification (Continued).

Articles of diet.	In stomach.		In vials.	
	How prepared.	Time.	How prepared.	Time.
		h. m.		h. m.
Eggs, fresh	Hard boiled	3 30	Hard boiled	8 00
Eggs, fresh	Soft boiled	3 00	Soft boiled	6 30
Eggs, fresh	Fried	3 30		
Eggs, fresh	Roasted	2 15		
Eggs, fresh	Raw	2 00	Raw	4 15
Eggs, whipped	"	1 30	Whipped	4 00
Custard	Baked	2 45	Baked	6 30
Codfish, cured dry	Boiled	2 00	Boiled	5 00
Trout, salmon, fresh	"	1 30	"	3 30
Trout, salmon, fresh	Fried			
Bass, striped, fresh	Broiled	3 00		
Flounder, fresh	Fried	3 30		
Catfish, fresh	"	3 30		
Salmon, salted	Boiled	4 00	Boiled	7 45
Oysters, fresh	Raw	2 55	Raw, entire	7 30
Oysters, fresh	Roasted	3 15		
Oysters, fresh	Stewed	3 30	Stewed	8 25
Beef, fresh, lean, rare	Roasted	3 00	Roasted	
Beef, fresh, lean, dry	"	3 30	"	7 45
Beefsteak	Broiled	3 00	Masticated	8 15
Beefsteak	"	. .	Cut fine	8 00
Beefsteak	Raw	. .	"	8 15
Beef, with salt only	Boiled	2 45	. . . . . .	9 30
Beef, with mustard, etc.	"	3 30		
Beef, fresh, lean	"	. .	Masticated	
Beef	"	. .	Entire piece	9 00
Beef	Fried	4 00		
Beef, old, hard, salted	Boiled	4 15		
Pork steak	Broiled	3 15		
Pork, fat and lean	Roasted	5 15		
Pork, recently salted	Boiled	4 30	Masticated	6 30
Pork, recently salted	Fried	4 15		
Pork, recently salted	Broiled	3 15		
Pork, recently salted	Raw	3 00	Raw	8 30
Pork, recently salted	Stewed	3 00		
Mutton, fresh	Roasted	3 15		
Mutton, fresh	Broiled	3 00	Masticated	6 45
Mutton, fresh	"	. .	Unmasticated	8 30
Mutton, fresh	Boiled	3 00		
Veal, fresh	Broiled	4 00		
Veal, fresh	Fried	4 30		
Fowls, domestic	Boiled	4 00	Masticated	6 30
Fowls, domestic	Roasted	4 00		
Ducks, domestic	"	4 00		
Ducks, wild	"	4 30		
Suet, beef, fresh	Boiled	5 30	Entire piece	12 00

Mean Time of Chymification (Continued).

Articles of diet.	In stomach.		In vials.	
	How prepared.	Time.	How prepared.	Time.
		h. m.		h. m.
Suet, mutton	Boiled	4 30	Divided	10 00
Butter	Melted	3 30		
Cream	. . . . . .	. .	Raw	25 30
Cheese, old, strong	Raw	3 30	Masticated	7 15
Cheese, old, strong	. . . . . .	. .	Entire piece	18 00
Cheese, new, mild	. . . . . .	. .	Divided	8 30
Oil, olive	. . . . . .	. .	Raw	60 00
Soup, beef, vegetables, and bread	Boiled	4 00		
Soup, marrow bones	"	4 15		
Soup, bean	"	3 00		
Soup, barley	"	1 30		
Soup, mutton	"	3 30		
Green corn and beans	"	3 45		
Chicken soup	"	3 00		
Oyster soup	"	3 30		
Hash, meat and vegetables	Warmed	2 30		
Sausage, fresh	Broiled	3 20		
Heart, animal	Fried	4 00	Entire piece	13 30
Tendon	Boiled	5 30	Masticated	12 45
Tendon	. . . . . .	. .	Entire piece	24 00
Cartilage	Boiled	4 15	Masticated	10 00
Cartilage	. . . . . .	. .	Divided	12 00
Aponeurosis	Boiled	3 00	Boiled	6 30
Bone, beef's solid	. . . . . .	. .	Entire piece	80 00
Bone, hog's solid	. . . . . .	. .	Entire piece	80 00
Beans, pod	Boiled	2 30		
Bread, white, fresh	Baked	3 30	Masticated	4 30
Bread, corn	"	3 15		
Cake, corn	"	3 00		
Cake, sponge	"	2 30	Broken	6 15
Dumpling, apple	Boiled	3 00		
Apples, sour, hard	Raw	2 50	Entire piece	18 00
Apples, sour, mellow	Raw	2 00	Masticated	8 30
Apples, sweet, mellow	"	1 30	"	6 45
Parsnips	Boiled	2 30	Mashed	6 45
Parsnips	"	. .	Entire piece	13 15
Parsnips	Raw	. .	"	18 00
Carrot, orange	Boiled	3 15	Mashed	6 45
Carrot, orange	. . . . . .	. .	Entire piece	12 30
Carrot, orange	. . . . . .	. .	Raw "	17 15
Beets	Boiled	3 45		
Turnips, flat	"	3 30		
Potatoes, Irish	"	3 30	Mashed	8 30
Potatoes, Irish	. . . . . .	. .	Entire piece	14 00
Potatoes, Irish	Roasted	2 30		

Mean Time of Chymification (Continued).

Articles of diet.	In stomach.		In vials.	
	How prepared.	Time.	How prepared.	Time.
		h. m.		*h. m.*
Potatoes, Irish	Baked	2 30		
Cabbage, head	Raw	2 30	Masticated	12 30
Cabbage with vinegar	"	2 00	Shaved	10 15
Cabbage	Boiled	4 30	Boiled	20 00
Peach, mellow	....	..	Cut small	10 00
Peach, mellow	....	..	Mashed	6 00

"The foregoing table was computed from all the experiments made upon St. Martin since 1825, taking the average from such as were generally performed under the naturally healthy condition of the stomach and with ordinary exercise."

Penzoldt has devised the following table giving the digestibility of food. He experimented on normal cases, achieving his results by means of the stomach tube, by determining the progress of digestion and the exact time at which the stomach was entirely empty after eating a certain quantity of a special food. The table shows the period of time it takes a given quantity of food to leave the stomach:

One to two hours:

100–200 gm. pure water.
220 gm. carbonated water.
200 gm. tea, alone.
200 gm. coffee, alone.
200 gm. cocoa, alone.
200 gm. beer.
200 gm. light wines.
100–200 gm. boiled milk.
200 gm. meat broth, alone.
100 gm. eggs, soft.

Two to three hours:

200 gm. coffee with cream.
200 gm. cocoa with milk.
200 gm. Malaga wine.
200 gm. "Ofner" wine.
300–500 gm. water.
300–500 gm. beer.

Three to four hours:

230 gm. young chicken, boiled.
230 gm. partridge, boiled.
220–260 gm. pigeon, boiled.
195 gm. pigeon, fried.
250 gm. beef, raw, boiled, lean.
250 gm. calves' feet, boiled.
160 gm. ham, boiled.
160 gm. ham, raw.
100 gm. veal, warm and cold, lean.
100 gm. beefsteak, broiled, cold or warm.
100 gm. beefsteak, raw, scraped.
100 gm. tenderloin.
200 gm. Rhine salmon, boiled.
75 gm. caviare, salted.
200 gm. sardines in vinegar, kippered herring.

Penzoldt digestibility table (*continued*).

Two to three hours:

300–500 gm. boiled milk.
100 gm. eggs, raw and scrambled, hard-boiled or as omelet.
100 gm. beef sausage, raw.
250 gm. calves' brains, boiled.
250 gm. calves' thymus, boiled.
72 gm. oysters, raw.
200 gm. carp, boiled.
200 gm. pike, boiled.
200 gm. shellfish, boiled.
200 gm. cod, boiled.
150 gm. cauliflower, boiled.
150 gm. cauliflower, as salad.
150 gm. asparagus, boiled.
150 gm. potatoes, boiled in salt water.
150 gm. mashed potatoes.
150 gm. stewed cherries.
150 gm. raw cherries.
70 gm. white bread, old or fresh, dry or with tea.
70 gm. pretzels.
70 gm. zwieback, fresh or stale, dry or with tea.
50 gm. Albert biscuits.

Three to four hours:

150 gm. blackbread.
150 gm. barley bread.
150 gm. wheat bread.
100–150 gm. Albert biscuits.
150 gm. potato, as vegetable.
150 gm. rice, boiled.
150 gm. kohlrabi, boiled.
150 gm. carrots, boiled.
150 gm. spinach, boiled.
150 gm. cucumber salad.
150 gm. radishes, raw.
150 gm. apples.

Four to five hours.

210 gm. pigeon, broiled.
250 gm. fillet of beef, broiled.
250 gm. beefsteak, broiled.
250 gm. beef tongue, smoked.
100 gm. smoked beef in slices.
250 gm. hare, broiled.
250 gm. partridge, broiled.
250 gm. goose, broiled.
280 gm. duck, broiled.
200 gm. herring, salted.
150 gm. lentils, mashed.
200 gm. peas as purée.
150 gm. string-beans.

Penzoldt has also constructed a series of four diet lists based on the length of time at which various foods leave the stomach, depending upon their mode of preparation and on other qualities of the food. They agree in the main with Leube's diet lists, but are more complete and exact.

These diet lists are utilized in the treatment of diseases of the stomach requiring a gradual change from the most digestible form of liquid food to solid foods more difficult of digestion. Ulcer of the stomach may be cited as an example. The first list is followed for ten days; the second, for the succeeding ten days; the third, for the following eight days, and the fourth, for fourteen days.

Beginning with broth, milk, and eggs in the first days, the patient is given such food as roast beef, fish, and asparagus at the end of one month.

PENZOLDT'S DIET LISTS.

Diet I. (about Ten Days).

Food or drink.	Largest quantity to be taken at one time	Method of preparation.	Special requirements.	How to be eaten.
Meat broth.	250 gm.	From beef.	Without fat, or not salted.	Slowly.
Cows' milk.	250 gm.	Well boiled or sterilized.	Entire milk (or lime water, ⅓; milk, ⅔).	If desired, with a little tea.
Eggs.	1 or 2	Very soft, just heated or raw.	Fresh.	If taken raw, should be stirred into the warm, not boiling, meat broth.
Meat solution (Leube-Rosenthal).	30–40 gm.		Should have only a slight meat-broth odor.	In teaspoonful doses, stirred in meat broth.
Cakes (Albert biscuits).	6		Without sugar.	
Water.	⅛ liter.		Ordinary water or natural carbonated water with a small percentage of CO_2 (Seltzer).	Not too cold.

Diet II. (about Ten Days).

Calves' brains.	100 gm.	Boiled.	Freed from all membranes.	Best taken in meat broth.
Thymus (calf).	100 gm.	Boiled.	Freed from all membranes.	Best taken in meat broth.
Pigeon.	1	Boiled.	Only if young, without skin, tendons, and the like.	Best taken in meat broth.
Chicken.	As large as a pigeon.	Boiled.	As above (no fattened chicken).	Best taken in meat broth.
Raw beef.	100 gm.	Chopped fine or scraped, with a little salt.	From the tenderloin.	To be eaten with cakes.
Raw beef sausage.	100 gm.	Without any additions.	Smoked a little.	To be eaten with cakes.
Tapioca.	30 gm.	Boiled with milk to make gruel.		

Diet III. (about Eight Days).

Food or drink.	Largest quantity to be taken at one time.	Method of preparation.	Special requirements.	How to be eaten.
Pigeon.	1	Broiled with fresh butter.	Only young bird, skin, etc.	Without gravy.
Chicken.	1	Broiled with fresh butter.	Only young bird, skin, etc.	Without gravy.
Beefsteak.	100 gm.	With fresh butter half-rare (English).	From the tenderloin, well beaten.	Without gravy.
Ham.	100 gm.	Raw, scraped fine.	Smoked a little, without the bone.	With white bread.
Milk bread, zwieback or Frieberger pretzels.	50 gm.	Crisped, baked.	Stale (so-called rolls, etc.).	To be carefully masticated and well salivated.
Potatoes.	50 gm.	(*a*) Mashed, (*b*) boiled in salt water and mashed.	The potatoes should be mealy and crumble on crushing.	
Cauliflower.	50 gm.	As a vegetable, boiled in salt water.	Use only the flowers.	

Diet IV. (about Eight to Fourteen Days).

Venison.	100 gm.	Roasted.	From the back, should hang for a time.	
Partridge.	1	Roasted without bacon.	Young birds, without skins, tendons, legs, etc. should hang for a time.	
Roast beef.	100 gm.	Medium to rare.	From good, fatted cattle; beaten.	Warm or cold.
Fillet of beef.	100 gm.	Medium to rare.	From good, fatted cattle; beaten.	Warm or cold.
Veal.		Roasted.	Back or leg.	Warm or cold.
Pike Shad Carp Trout	100 gm.	Boiled in salt water without any additions.	All fish bones should be carefully removed.	In the fish gravy.
Caviare.	50 gm.	Raw.	Slightly salt, Russian caviare.	
Rice.	50 gm.	Mashed, pushed through a sieve.		
Asparagus.	50 gm.	Boiled.	Soft, without any of the hard parts.	With a little melted butter.
Scramb'd eggs.	2	With a little fresh butter and salt.		
Omelet (soufflé)	2	With about 20 gm. of sugar.	Must have risen well.	To be eaten at once.
Fruit sauce.	50 gm.	From fresh boiled fruit, to be strained through a sieve	Free from all kernels and peel.	
Red wine.	100 gm.	Light, pure Bordeaux.	Or some corresponding kind of red wine.	Slightly warm.

These tables of Penzoldt are valuable as a basis for the selection of food in gastric disturbances. In these cases it is important that the food be quickly dissolved in the gastric secretion, that it be readily absorbed, that it be neither fermented nor decomposed while being digested or absorbed, and that the entire process be inattended with discomfort. It must be borne in mind that the digestibility of food varies widely with the individual taste, for no matter how digestible a food may be, if it is unpalatable it will not be digested properly. In general it may be said: First, that in acute conditions the food should be of such a character that the stomach should be spared as much work as possible; second, in chronic disturbances it is important to supply sufficient quantities of nourishment in an easily digestible form, so as to maintain the body weight so far as possible. In determining the quantity of food that is necessary during twenty-four hours, the amount is estimated in calories of heat. As is well known, a human being at rest requires 35 calories per kilo of weight; whereas while he is performing light work he requires 40 calories. In order, therefore, to determine the exact amount of nourishment, it is only necessary to know the weight of the individual. Inasmuch as the proteins can be replaced in a measure by the carbohydrates and fats, an interchange of any of these three food elements can be made according to the patient's condition. When the weight of the person is known, it is an easy matter to determine whether the amount of nourishment given is sufficient to maintain the body weight.

It is well also to weigh every patient suffering with a stomach disorder when treatment is first inaugurated, and to repeat this from time to time, in order

to determine whether the patient is gaining or losing flesh.

The diet must be considered from the standpoint of the gastric secretion; there may exist, on the one hand, the condition of oversecretion of acid; on the other, lessened secretion or absence of acid.

In cases of oversecretion an abundant protein diet is indicated, inasmuch as the excess of hydrochloric acid is neutralized by this class of foods. Ordinarily, the proteins that are best adapted for patients suffering from oversecretion of acid are the red meats and eggs, whereas the carbohydrates must be given in the most easily digestible form.

In cases in which there is a diminution of the gastric secretion the protein foods are digested with difficulty, whereas the carbohydrates are more easily digested. In this condition, therefore, only very tender meats, preferably scraped, are to be given; whereas such easily digestible vegetables as spinach, asparagus, mashed potatoes, and farinaceous foods may be eaten in quite large quantities. In both conditions of increased and diminished secretion of acid a reasonable amount of fat must be eaten, preferably in the form of good butter.

The diet in muscular disturbances of the stomach depends greatly upon whether an excess or a deficiency of gastric juice is secreted; if there is an increase, an excess in protein food gives the best results; if, on the other hand, there is a diminution of this secretion, protein food must be given the patient in the most easily digestible form. The carbohydrates and the lighter vegetables may be given in somewhat larger proportion. In both conditions the ingestion of fluids should be reduced so far as possible.

Normally, the appetite is a fair indication of the number of calories of heat that may be required; in conditions of gastric disorder, however, this is not the case; these patients lose their appetite, and consequently often take insufficient nutrition. In those instances in which the gastric disorder is somewhat protracted and accompanied by great loss of weight and in which the patient takes insufficient nourishment, it need only be borne in mind that such a patient, resting quietly in bed, requires only about one-sixth of the number of calories necessary for a patient who is not resting. This plan may therefore be used with advantage in the treatment of many patients suffering from disorders of the stomach.

Liquid Foods in Gastric Disorders.—In these cases, in which it is necessary to spare the stomach as much work as possible, milk is the food that is usually most easily borne. In order to supply a sufficient number of calories it must be taken in large quantities, frequently diluted with lime water or barley water in order to add to its digestibility, or flavored with coffee, tea, or cocoa to lend variety and add to its palatability. In those cases in which milk is not well borne, buttermilk, whey, kumiss, and kefir may serve as substitutes. Among the other forms of fluids that may be given are broths (chicken, beef, mutton), bouillon, beef tea, and meat juice. Of these, meat juice is most nutritious.

Gelatinous Forms of Food.—Gelatinous articles of food, as gelatin, calves' feet, etc., are easily digested and readily absorbed.

Meats.—The digestibility of meat can be increased by chopping, beating, grinding, scraping, etc.

Eggs.—The digestibility of eggs depends upon their

mode of preparation; raw and soft-boiled eggs are usually the most easily digestible forms.

Fish.—In regard to fish, those containing but little fat are to be recommended for patients suffering from gastric disturbances, such as shellfish, pike, trout, carp, and halibut.

Carbohydrates.—The number of vegetables from which selection may be made is large. The secretion from the mouth and intestines play an important rôle in the digestion of these substances. They should be masticated thoroughly. In those cases in which there is danger of fermentation they should be given with caution. The best form in which to give amylaceous food is in the form of zwieback, toast, stale wheat bread, tapioca flour, oatmeal, etc.

Leguminous foods contain a considerable amount of protein, much of which, however, is not absorbed. They are apt to give rise to considerable fermentation. Potatoes are best given mashed or baked. Cabbage contains much cellulose and should be omitted from the diet of all patients suffering from stomach disorders.

Fruits are of slight nutritive value, but give a relish to other foods and increase intestinal peristalsis.

Fat is to be recommended because of its tendency to increase the weight of the patient, and also because of its high caloric value. Some observers claim, however, that it acts as an irritant to the stomach. It is true that many patients find that fat meat, greasy gravies, etc., give rise to indigestion, and often to nausea and vomiting. Much depends, however, on the mode of preparation. A considerable amount of fat may be given in the forms of fresh butter spread on wheat bread or toast. Certain forms of chocolate contain quite a large percentage of fat, and on this account are very nutritious. Of these,

Mehring's Vigor Chocolate is to be especially recommended. Olive oil has recently been recommended in the treatment of certain gastric disorders.

Special Factors Bearing on the Diet in Patients Suffering from Gastric Disturbances.—1. Von Noorden demonstrated the fact that the intestine will vicariously perform the work of the stomach in conditions in which the secretion of the latter is lost. The point to be borne in mind is that even in cases in which the secretion of the stomach is lost entirely, the intestine may assume this function of the stomach.

2. In those cases in which it is necessary to spare the stomach, as when food can not be digested or is vomited, either predigested foods may be utilized or foods may be administered through channels other than the stomach. Among the artificial predigested preparations are the albumoses and peptones, Denayer's Albumose-peptone, Somatose, Nutrose, and Mosquera Beef Meal. For the various methods of feeding, the reader is referred to the sections on Rectal Feeding, Subcutaneous Feeding, etc.

3. The following rules for eating should be carried out:

(*a*) Food should be thoroughly masticated; this is especially important in those cases in which there are marked gastric disturbances.

(*b*) The meals should be taken at regular intervals and in moderate quantities, according to the nature of the gastric disease.

(*c*) The temperature of the food is also an important factor in the treatment of gastric disturbances; as Uffelmann has pointed out, the food should be taken at a temperature between 98° and 100° F. The ingestion of very hot food is believed to be a frequent cause of ulcer of the stomach. On the other hand, Wegele attributes the dys-

pepsia of many Americans to the taking of ice-cold water and other cold drinks.

(*d*) The question of rest or exercise after eating is one that is of considerable importance to those suffering from gastric disturbances. It is generally admitted that violent exercise should not be indulged in after eating.

From the authors' observations, it appears that in conditions of gastric disturbances accompanied by increased or decreased acidity and in muscular disturbances of the stomach, the gastric digestion is improved during rest, but impaired by sleep, after meals.

Special Cures in the Treatment of the Diseases of the Stomach.—Among the special forms of treatment recommended in gastric disturbances may be mentioned the rest cure, the milk cure, the grape cure, and forced feeding or gavage.

The **rest cure,** first devised by Weir Mitchell, plays an important rôle in the treatment of stomach disorders. This treatment is especially useful in cases of nervous stomach disorders. It is also useful in the treatment of ulcer, gastritis, and other conditions. The rest treatment in gastric disorders should be carried out for from six to eight weeks. The patient should be confined to bed a large part of this time and given a varied diet, food being supplied every two to three hours. Boas advises that instead of the large quantities of milk usually prescribed, the patient will do better if given ½ to 1 liter of cream daily in portions of 150 to 200 c.c. In addition to the protein food he advises a diet rich in carbohydrates and fats. The results that follow this plan of treatment are often marvellous. For a further consideration of the method and plan of conducting the rest treatment systematically, the reader is referred to the section dealing with that subject.

Milk Cure.—The underlying principle of the milk cure consists in the ingestion of large quantities of milk, either alone or together with other foods. Under normal conditions, when taken alone in large quantities—say three liters a day—milk does not suffice as a food; in certain digestive disturbances, however, milk given alone for a time forms a useful food and allows the stomach to regain its normal tone and functions. Milk is especially useful in the treatment of ulcer of the stomach and in certain forms of chronic gastritis; it is particularly useful in the secondary forms of gastritis, as those depending upon tuberculosis, anemia, etc. In some cases of nervous dyspepsia milk cures sometimes effect remarkable results; whereas in others milk disagrees and, as a consequence, the milk cure can not be undertaken. When there is a diminution or an absence of acid in the stomach, milk is usually not well borne. It is also contra-indicated in severe cases of muscular relaxation of the stomach and in intestinal conditions accompanied by extreme flatulence and chronic diarrheas.

When milk is given in large quantities in addition to other foods, it is more frequently better borne and is less apt to disagree. One of the disadvantages of the milk cure is the obstinate constipation the milk is apt to induce. Milk can often be rendered more digestible by the addition of barley water, lime water, milk of magnesia, and the like, or small quantities of coffee, tea, or whisky may be added to it. When milk disagrees, cream, buttermilk, kefir, kumiss, or matzoon may be given as a substitute for it. (See Milk Cure.)

Forced Feeding or Gavage.—This method consists in introducing milk, eggs, and meat extracts into the stomach by means of the stomach tube.

Grape Cure.—In this form of treatment the patient

lives exclusively upon grapes; it is especially useful in obese individuals, in whom it is important to diminish the weight; in anemia, girls suffering with dyspepsia, and in certain cases of nervous dyspepsia.

DIET IN DYSPHAGIA (DIFFICULTY IN SWALLOWING).

Dysphagia may be due to any obstruction in the mouth, pharynx, or esophagus. The difficulty and pain induced by swallowing must be obviated by lessening as much as possible the efforts at swallowing; for this reason food must be given in a concentrated form, and only in a liquid or semi-solid state; milk, egg albumin, and the concentrated liquid beef preparations are especially useful in this condition. In those cases in which food can not be swallowed in sufficient quantities the patient must be fed through the stomach tube. In this way broths, gruel, milk, and the like can be passed into the stomach.

DIET IN ACUTE GASTRITIS.

Oser has said that "every case of acute catarrh of the stomach has a natural tendency to heal of its own accord unless a chronic form is produced by a mistaken diet or wrong medication." It is a generally admitted fact that in the treatment of this condition the diet plays the leading rôle. The first step in the treatment consists of securing absolute rest for the stomach and a total abstinence from food for at least twenty-four hours. This procedure is sometimes very difficult to carry out, for many patients believe that food is necessary for them, and that they can secure relief more quickly by taking nourishment. The nausea and vomiting which are present in more or less degree in this condition, and which are aggravated by the taking of food, will soon convince the

16

patient of the necessity of abstaining from food. The thirst is, however, so severe in these cases that patients may be allowed to rinse the mouth with water frequently, to retain tiny bits of ice in the mouth, or even to drink very small quantities of carbonated waters. With this plan of treatment recovery generally follows in two or three days. After the first twenty-four hours feeding may be begun by giving cautiously small quantities of milk diluted with lime water, broths, and egg albumin; these can gradually be increased in quantity, and during the next day or two boiled chicken, sweetbreads, scraped beef, in addition to toast, may be added.

The authors are accustomed to prescribe the following diet about the second or third day after an attack of acute gastritis:

		Calories.
7 A. M.:	150 gm. milk with lime water	101
9 A. M.:	100 gm. egg albumin flavored with orange or lemon juice,	53
11 A. M.:	150 gm. broth with egg	84
1 P. M.:	150 gm. milk with lime water	101
3 P. M.:	5 gm. Armour's soluble beef in water	10
5 P. M.:	100 gm. egg albumin flavored with orange or lemon juice,	53
7 P. M.:	150 gm. milk with lime water	101
		503

After the third day the diet is increased as follows:

		Calories.
7 A. M.:	150 gm. milk (101) with 70 gm. toast (182)	283
9 A. M.:	2 very soft-boiled eggs	160
11 A. M.:	200 gm. bouillon with 1 egg	85
1 P. M.:	100 gm. rice cooked in milk	177
	70 gm. toast	182
3 P. M.:	100 gm. egg albumin (53) with 50 gm. crackers (187)	240
5 P. M.:	150 gm. milk with 70 gm. toast	283
7 P. M.:	100 gm. egg albumin flavored with orange or lemon juice,	53
		1463

[1] In comparing these diet lists slight discrepancies in the calorie values of the foods will be noted. These differences have arisen from some authors using the calorie values of raw foods, while others have computed the values of cooked foods. In the diet lists given by the authors, calorie value of foods as prepared for the table are given.

DIET IN CHRONIC GASTRITIS.

The dietetic treatment of chronic gastritis is of far greater importance than the treatment of this disease by the use of drugs. The diet must be varied according to the stage of the disease. The most easily borne forms of food are liquids, such as broths; unfortunately, these foods do not furnish sufficient nutriment to sustain the patient. Their nutritive value may be increased by the addition of beef extracts, eggs, barley and rice, peptones, somatose, etc.

The diet should vary according to the character of the gastritis; in those cases in which the gastric secretion has entirely or almost entirely disappeared, protein food is digested with great difficulty; it must therefore be given in the most digestible form; of these foods, scraped beef, stewed beef, stewed chicken, broiled steak, and boiled sweetbreads are especially to be recommended. Vegetables should also be given in the most digestible form, best as a mush. Milk is useful in most cases; occasionally, however, it is not well borne; when this is the case, it can be made more agreeable by adding small quantities of rice, potatoes, or cocoa to it, or kefir, kumiss, or matzoon may be substituted for it. In those conditions in which considerable acid still remains in the stomach, meats in various forms are very acceptable; to this list may be added fish and eggs; vegetables, such as mashed potatoes, spinach, mashed carrots, especially in the form of purées, are to be recommended. In all instances fat should be given in an easily digestible form—as good butter, cocoanut butter, or Mehring's Vigor Chocolate. It is impossible to formulate exact rules as to the number of meals that should be eaten and the

quantity that should be taken at each meal; in a general way, small frequent meals are best borne.

Water should be taken in small quantities between meals. Alcoholic stimulants or any strong stimulants should, as a rule, be omitted; when utilized, they should be given in small quantities and best diluted with mineral waters. Salt and spices may be allowed occasionally in small quantities.

The authors have found the following diet list useful in cases of chronic gastritis:

		Calories.
8 A. M.:	200 gm. milk flavored with tea	135
	60 gm. stale bread (154) with 40 gm. butter (326)	480
	1 soft-boiled egg	80
10 A. M.:	100 gm. scraped beef (119) with 60 gm. stale bread or toast (154)	273
	(or chicken sandwich (260) or 50 gm. sherry (60) with egg (80))	
11 A. M.:	Bouillon with egg	84
	100 gm. chicken	106
	(or 100 gm. lamb chops (230) or 100 gm. broiled steak (209)).	
	100 gm. spinach	166
	100 gm. mashed potatoes	127
	100 gm. stewed apples	53
	60 gm. toast	154
4 P. M.:	120 gm. milk with tea	81
	30 gm. crackers	102
7 P. M.:	60 gm. stale bread (154) with 40 gm. butter (326)	480
	200 gm. milk	135
		2456

DIET IN DILATATION OF THE STOMACH.

Dilatation of the stomach may be either acute or chronic. The acute form is but rarely seen. Chronic dilatation results either from a narrowing of the pylorus or from weakness of the muscular walls of the stomach. This latter form may be seen in diabetes, the insane, and in beer drinkers, as well as under many other conditions.

In the dietetic treatment of dilatation of the stomach, it must be remembered that fluids are badly borne, and must, therefore, be given only in very small quantities—not over 1 to 1½ liters a day. The fluids that are permissible are milk, cream, coffee, tea, and bouillon, all in small quantities. The thirst that accompanies this disease may be relieved by allowing the patient to suck bits of ice or by giving rectal injections of water or normal salt solution. Since nutrition is usually very faulty in this disease, nutrient enemata must frequently be employed. When milk is administered, such substances as tapioca and rice should be added. Egg or concentrated meat extracts should be added to bouillon to increase its nutritive value. Meats should be given only in the most digestible forms; of these, stewed chicken, boiled sweetbreads, calves' brains, and scraped beef are to be preferred. Vegetables, such as carrots, spinach, peas, potatoes, should be administered in the form of purées. Bread should be eaten stale; wheat bread or toast is best. Stewed fruits, such as stewed prunes, and baked apples are also permissible. Since fats are apt to cause fermentation, butter should be allowed only in quite small quantities. Alcohol is not to be recommended in this condition; if it must be used, it is best given in the form of some light wine. Strong spices should always be avoided.

The special feature of the treatment consists in giving frequent concentrated meals. Patients with dilation of the stomach should be cautioned against visiting watering-places for the purpose of drinking the waters.

The diet list given on the following page is the one used by the authors in dilation of the stomach.

		Calories.
8 A. M.:	100 gm. milk with tea	67
	50 gm. stale wheat bread	130
	10 gm. butter	80
	1 egg	80
10 A. M.:	100 gm. raw scraped beef	118
	50 gm. toast	130
	10 gm. butter	80
	50 c.c. sherry wine	60
12 M.:	150 gm. broiled steak	315
	or 150 gm. lamb chops and chicken.	
	100 gm. baked potatoes	127
	100 gm. spinach	166
	or 100 gm. asparagus (185),	
	or 100 gm. peas, mashed and strained (318),	
	or 100 gm. carrots, mashed and strained (41).	
4 P. M.:	100 gm. cream	214
	50 gm. stale bread	130
	10 gm. butter	80
7 P. M.:	100 gm. boiled rockfish	80
	50 gm. stale wheat bread	130
	10 gm. butter	80
		2067

DIET IN ATONIC DYSPEPSIA.

Since atonic dyspepsia is frequently caused by injudicious and too rapid eating, persons with feeble digestive powers should exercise especial caution to eat slowly, masticate thoroughly, and avoid indigestible food. Persons suffering from atonic dyspepsia should eat small quantities of food at frequent intervals. Since water is not absorbed in the stomach to any extent, it is advisable that the quantity of fluids taken should not exceed 1½ liters a day; this amount should include all fluids—coffee, tea, soups, etc. If the thirst is very great, enemata of water or nutrient enemata may be administered.

The use of milk in large quantities, as has been recommended, is not generally to be advised when the patient is able to go about, since the weight of large quantities of milk may overdistend the stomach; when, however, a rest cure is instituted, milk is commonly well borne, even in very large quantities. The diet in atonic dyspepsia varies according to the nature of the gastric secretion.

In cases in which there is an excess of acid a liberal meat diet, consisting especially of chicken, beef, mutton, or ham, is to be recommended; fish, eggs, hard- and soft-boiled, are also permissible; the vegetables should be selected with care; carrots, peas, beans, and cauliflower may be given, but must be mashed and strained so as to rid them of cellulose; potatoes, rice, and grits may also be allowed. Butter is the form of fat best suited to this condition. Alcoholic stimulants are, as a rule, not well borne, and their use should be prohibited; in a limited number of cases alcohol in the form of a light wine acts as a stomachic and may be prescribed.

In those cases in which there is an absence or a diminution of acid in the gastric secretion, the lighter forms of meat, such as the white meat of chicken or fish, sweetbreads, stewed chicken, or raw scraped beef, should be allowed; vegetables, on the other hand, must be given in somewhat larger quantities.

The treatment of the chronic constipation accompanying atonic dyspepsia, since it is one of the most constant symptoms, requires special mention. In the treatment of this condition the main reliance must be placed on the diet. Such forms of foods should be given as will, in the course of digestion, produce substances that excite intestinal peristalsis; among these foods may be mentioned Graham bread, certain vegetables, such as carrots, beans, tomatoes, peas, and turnips, macaroni, stewed and raw fruits, buttermilk, honey, and cider. This form of diet will often overcome the constipation without the aid of drugs. (For a more extensive consideration of the dietetic treatment of chronic constipation, the reader is referred to the section dealing with that subject.)

The following list has been used by the authors in the treatment of atonic dyspepsia:

		Calories.
7 A. M.:	40 gm. orange juice	88
8 A. M.:	200 gm. milk	135
	1 soft-boiled egg	80
	60 gm. toast	154
	40 gm. butter	325
10 A. M.:	100 gm. raw scraped beef	118
	60 gm. stale wheat bread	154
12 M.:	100 gm. broiled steak	209
	or 100 gm. lamb chops (230),	
	or 100 gm. stewed chicken (106).	
	200 gm. asparagus	37
	or 100 gm. peas (318),	
	or 100 gm. spinach (165).	
	100 gm. mashed potatoes	127
	100 gm. apple sauce	53
	50 gm. bread (stale)	130
3 P. M.:	200 gm. milk	135
	60 gm. wheat bread	154
	40 gm. butter	325
7 P. M.:	100 gm. boiled rock-fish	80
	100 gm. milk	67
	60 gm. bread	154
	40 gm. butter	325
		2850

DIET IN ULCER OF THE STOMACH.

Much can be done by a carefully selected diet to prevent the onset of an ulcer of the stomach. As soon as the very first symptoms become manifest, the patient should be placed upon an absolute milk diet. The temperature of the food should be regulated, so that it be not given too hot nor too cold.

Boas divides the treatment of ulcers of the stomach into several stages:

Stage of Hemorrhage.—In this stage Boas advises absolute rest in bed; the patient not even being allowed to arise for purposes of defecation or urination. No nourishment whatever should be given by the mouth. In robust individuals even nutrient enemata may be omitted. If the patient is weak or in feeble condition, feeding by the rectum may be instituted. (See the section on Nutrient Enemata for the method of preparation

and utilization of this mode of feeding.) Only two or three nutrient enemata are to be given daily. Boas carries out this plan for three or four days. After this he gradually begins mouth-feeding, the nourishment consisting exclusively of fluids given at a temperature of 98° to 100° F. He prefers milk diluted with lime water, with tea, or with coffee. In addition he permits beef tea, freshly expressed or artificial beef juice, and egg albumin. The carbonated waters, such as Vichy, are also useful.

After the first week Boas begins the regular Leube and v. Ziemssen ulcer treatment, which he conducts as follows: The patient is given a one-fourth liter of Carlsbad water, which he drinks in bed morning and evening. Hot-water applications are placed on the abdomen. The diet during this stage consists mainly of milk in addition to other fluids. If the patient is very weak, nutrient enemata may occasionally be given.

In the treatment, beginning with the third and continuing during the fourth week, Boas permits the patient to recline on a couch and continues the use of the Carlsbad water, which should be given for four weeks from the time it is first taken; he advises that the diet still consist mainly of milk, although he now permits the addition of soaked zwieback, scalded crackers, and soft rolls. Meats (sweetbreads, brains, meat balls), fish (perch, oysters in small quantities), in addition to the light red wine and carbonated waters, are also allowed.

After the fourth week, if the patient is doing well, Boas adds from 50 to 200 gm. of mashed potatoes, stewed fruits, and vegetables, such as spinach, carrots, peas, and turnips, in the form of purées, to the diet previously given. The meats (broiled steak, chops, and roast beef), if well cooked, can finally be given more

liberally. According to Boas, the patient should avoid raw fruit, acid and highly seasoned foods, and also very hot and very cold drinks for many years. Even in those cases in which there has been no hemorrhage, Boas nevertheless advises the rest treatment. It is generally admitted that the rest cure is the only satisfactory plan for treating cases of ulcer of the stomach. Leube and Penzoldt have devised dietaries for these cases; these have been given elsewhere (see p. 232). The first dietary should be followed for ten days; the second, for the succeeding ten days; the third, for about eight days. The severity of the condition in each case must, of course, determine the length of time during which each dietary must be continued. In all instances milk seems to be the most useful form of food during the first weeks of this rest treatment. Occasionally milk does not agree, and substitutes must be given in its stead. Of these, buttermilk, kefir, matzoon, and kumiss or yoghurt are especially to be recommended.

In order to increase the food-value of milk, cream may be added, and the following calculation of Strauss may be utilized in order to estimate this increased value:

	Calories.
A. 100 gm. full milk	70
B. 75 gm. full milk with 25 gm. cream	115
C. 50 gm. full milk with 50 gm. cream	185
D. 25 gm. full milk with 75 gm. cream	205
E. 180 gm. cream	250

There are, therefore, of each (milk, milk and cream, and cream) in the half liter:

	Calories.
A	350
B	575
C	925
D	1025
E	1250

Lenhartz recently cautions against the strict abstinence diet in the treatment of ulcer of the stomach, even in

those instances in which there is hemorrhage. He bases his conclusions on the fact that since ulcer of the stomach is most frequently accompanied by superacidity and also by an enfeebled condition, it is best to give protein food early to overcome the acidity as well as to build up the system. The accompanying table illustrates his method of feeding:

Day after last hematemesis	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Eggs	2	3	4	5	6	7	8	8	8	8	8	8	8	8
Sugar, gm.			20	20	30	30	40	40	50	50	50	50	50	50
Milk, c.c.	200	300	400	500	600	700	800	900	1000	1000	1000	1000	1000	1000
Raw scraped beef, gm.						35	2×35	2×35	2×35	2×35	2×35	2×35	2×35	2×35
Milk cooked with rice, c.c.							100	100	200	200	300	300	300	300
Zwieback, gm.								20	40	40	60	60	80	100
Ham (raw), gm.										50	50	50	50	50
Butter, gm.										20	40	40	40	40
Calories	280	420	637	779	955	1135	1588	1721	2138	2478	2941	2941	3007	3073

In the Lenhartz cure, absolute rest in bed for at least four weeks is maintained. An ice-bag is placed on the abdomen, and left on more or less continually for two weeks. On the first day, even though there be hematemesis, 200 c.c. of iced milk are given in teaspoonful doses together with two raw, ice-cold, beaten up eggs. The eggs are beaten up with sugar, and they are kept cold by placing the cup containing them in a dish filled with ice. The milk is increased every day 100 grams, and one additional egg added; on the ninth day the patient is given 1 liter of milk, and the quantity is not increased; on the sixth day raw scraped beef is added, and the quantity is doubled on the following day; on the seventh and eighth days the patient is given some well-cooked rice and zwieback (softened), and on the tenth, raw ham and butter.

The following table, arranged by us, has been found exceedingly serviceable in treating cases of ulcer, according to the Lenhartz method.

During the first and second days of treatment, instead of giving the food at two-hour intervals it is given very frequently in teaspoonful doses, and ice cold. In following these diet tables, it is only necessary to remember that for practical purposes

4 drams of milk sugar are about one tablespoonful.
1 ounce of raw beef is about one tablespoonful.
5 drams of zwieback are about two slices.
5 drams of butter are about one tablespoonful.

LENHARTZ'S DIET, AS MODIFIED BY US FOR AMERICAN PATIENTS.

First Day.

8 A. M.:	Iced milk, 3 oz.
10 A. M.:	Iced egg, 1.
12 M.:	Milk, 2 oz.
4 P. M.:	Egg, 1.
6 P. M.:	Milk, 2 oz.
TOTAL:	Egg, 2.
	Milk, 7 oz.
	Calories, 280.

Second Day.

8 A. M.:	Milk, 3 oz.
10 A. M.:	Egg, 1.
12 M.:	Milk, 4 oz.
2 P. M.:	Egg, 1.
4 P. M.:	Milk, 3 oz.
6 P. M.:	Egg, 1.
TOTAL:	Eggs, 3.
	Milk, 10 oz.
	Calories, 420.

Third Day.

6 A. M.:	Milk, 3 dr.
	Milk sugar, 1 dr.
8 A. M.:	Egg, 1.
10 A. M.:	Milk, 3 oz.
	Milk sugar, 1 dr.
12 M.:	Egg, 1.
2 P. M.:	Milk, 4 oz.
	Milk sugar, 2 dr.
4 P. M.:	Egg, 1.
6 P. M.:	Milk, 3 oz.
	Milk sugar, 1 dr.
8 P. M.:	Egg, 1.
TOTAL:	Eggs, 4.
	Milk, 10 oz.
	Milk sugar, 5 dr.
	Calories, 637.

Fourth Day.

6 A. M.:	Milk, 4 oz.
	Milk sugar, 2 dr.
8 A. M.:	Egg, 1.
10 A. M.:	Milk, 4 oz.
	Milk sugar 2 dr.
12 M.:	Egg, 1.
2 P. M.:	Milk, 5 oz.
	Milk sugar, 2 dr.
4 P. M.:	Egg, 1.
6 P. M.:	Milk, 4 oz.
	Milk sugar, 2 dr.
8 P. M.:	Egg, 1.
TOTAL:	Eggs, 5.
	Milk, 17 oz.
	Milk sugar, 1 oz.
	Calories, 777.

Fifth Day.

6 A. M.: Milk, 5 oz.
Milk sugar, 2 dr.
8 A. M.: Eggs, 2.
10 A. M.: Milk, 5 oz.
Milk sugar, 2 dr.
12 M.: Eggs, 2.
2 P. M.: Milk, 5 oz.
Milk sugar, 2 dr.
4 P. M.: Egg, 1.
6 P. M.: Milk, 5 oz.
Milk sugar, 2 dr.
8 P. M.: Egg, 1.
TOTAL: Eggs, 6.
Milk, 10 oz.
Milk sugar, 1 oz.
Calories, 955.

Sixth Day.

6 A. M.: Milk, 5 oz.
Milk sugar, 3 dr.
8 A. M.: Eggs, 2.
10 A. M.: Milk, 6 oz.
Milk sugar, 2 dr.
12 M.: Eggs, 2.
2 P. M.: Milk, 6 oz.
Milk sugar, 3 dr.
Raw beef, 1 oz.
4 P. M.: Eggs, 2.
6 P. M.: Milk, 6 oz.
Milk sugar, 2 dr.
8 P. M.: Egg, 1.
TOTAL: Eggs, 7.
Raw Beef, 1 oz.
Milk, 23 oz.
Milk sugar, 10 dr.
Calories, 1135.

Seventh Day.

6 A. M.: Milk, 6 oz.
Milk sugar, 3 dr.
8 A. M.: Eggs, 2 raw.
10 A. M.: Milk, 7 oz.
Milk sugar, 3 dr.
Milk rice, 3 oz.
12 M.: Eggs, 2 (soft boiled).
2 P. M.: Milk, 6 oz.
Milk sugar, 4 dr.
Raw beef, 2 oz.
4 P. M.: Eggs, 2 (raw).
6 P. M.: Milk, 7 oz.
Milk sugar, 3 dr.
8 P. M.: Eggs, 2 (soft boiled).
TOTAL: Eggs, 8.
Milk, 27 oz.
Milk sugar, 13 dr.
Milk rice, 3 oz.
Raw beef, 2 oz.
Calories, 1585.

Eighth Day.

6 A. M.: Milk, 7 oz.
Milk sugar, 3 dr.
8 A. M.: Eggs, 2 (raw).
10 A. M.: Milk, 7 oz.
Milk sugar, 3 dr.
Milk rice, 3 oz.
12 M.: Eggs, 2 (soft boiled).
2 P. M.: Milk, 8 oz.
Milk sugar, 3 dr.
Raw beef, 2 oz.
Zwieback, 5 dr.
4 P. M.: Eggs, 2 (raw).
6 P. M.: Milk, 8 oz.
Milk sugar, 4 dr.
8 P. M.: Eggs, 2 (soft boiled).
TOTAL: Eggs, 8.
Milk, 30 oz.
Milk sugar, 13 dr.
Milk rice, 3 oz.
Raw beef, 2 oz.
Zwieback, 5 dr.
Calories, 1721.

Ninth Day.

6 A. M.:	Milk, 6 oz.	6 P. M.:	Milk, 7 oz.
	Milk sugar, 3 dr.		Milk sugar, 4 dr.
8 A. M.:	Eggs, 2.		Milk rice, 3 oz.
10 A. M.:	Milk, 6 oz.	8 P. M.:	Eggs, 2.
	Milk sugar, 3 dr.	10 P. M.:	Milk, 7 oz.
	Milk rice, 4 oz.	TOTAL:	Eggs, 8.
12 M.:	Eggs, 2.		Milk, 33 oz.
2 P. M.:	Milk, 7 oz.		Milk sugar, 13 dr.
	Milk sugar, 3 dr.		Milk rice, 7 oz.
	Raw beef, 2 oz.		Raw beef, 2 oz.
	Zwieback, 10 dr.		Zwieback, 10 dr.
4 P. M.:	Eggs, 2.		Calories, 2138.

Tenth Day.

6 A. M.:	Milk, 6 oz.		Butter, ½ dr.
	Milk sugar, 3 dr.	6 P. M.:	Milk, 7 oz.
	Raw beef, 2 oz.		Milk sugar, 4 dr.
8 A. M.:	Eggs, 2.		Milk rice, 3 oz.
	Butter ½ dr.		Butter, 1 dr.
10 A. M.:	Milk, 6 oz.	8 P. M.:	Eggs, 2.
	Milk sugar, 3 dr.		Butter, ½ dr.
	Milk rice, 4 oz.	10 P. M.:	Milk, 7 oz.
	Butter, 1 dr.	TOTAL:	Eggs, 8.
12 M.:	Eggs, 2.		Milk, 33 oz.
	Butter, ½ dr.		Milk sugar, 13 dr.
2 P. M.:	Milk, 7 oz.		Milk rice, 7 oz.
	Milk sugar, 3 dr.		Raw beef, 4 oz.
	Raw beef, 2 oz.		Zwieback, 12 dr.
	Zwieback, 12 dr.		Butter, 5 dr.
	Butter, 1 dr.		Calories, 2478.
4 P. M.:	Eggs, 2.		

Eleventh Day.

6 A. M.:	Milk, 6 oz.	4 P. M.:	Eggs, 2.
	Milk sugar, 3 dr.	6 P. M.:	Milk, 7 oz.
	Raw beef, 2 oz.		Milk rice, 5 oz.
	Zwieback, 1 oz.		Milk sugar, 4 dr.
	Butter, 5 dr.	8 P. M.:	Eggs, 2.
8 A. M.:	Eggs, 2.	10 P. M.:	Milk, 8 oz.
10 A. M.:	Milk, 6 oz.	TOTAL:	Eggs, 8.
	Milk sugar, 3 dr.		Milk, 34 oz.
	Milk rice, 5 oz.		Milk sugar, 13 dr.
12 M.:	Eggs, 2.		Milk rice, 10 oz.
2 P. M.:	Milk, 7 oz.		Zwieback, 2 oz.
	Milk sugar, 3 dr.		Raw beef, 4 oz.
	Raw beef, 2 oz.		Butter, 10 dr.
	Zwieback, 1 oz.		Calories, 2491.
	Butter, 5 dr.		

Twelfth Day.

6 A. M.: Milk, 6 oz.
Milk sugar, 3 dr.
Raw beef, 2 oz.
Zwieback, 1 oz.
Butter, 5 dr.
8 A. M.: Eggs, 2.
10 A. M.: Milk, 6 oz.
Milk rice, 5 oz.
Milk sugar, 3 dr.
12 M.: Eggs, 2.
2 P. M.: Milk, 7 oz.
Milk sugar, 3 dr.
Raw beef, 2 oz.
Zwieback, 1 oz.
Butter, 5 dr.
4 P. M.: Eggs, 2.
6 P. M.: Milk, 7 oz.
Milk sugar, 4 dr.
Milk rice, 5 oz.
8 P. M.: Eggs, 2.
10 P. M.: Milk, 8 oz.
TOTAL: Eggs, 8.
Milk, 34 oz.
Milk sugar, 13 dr.
Milk rice, 10 oz.
Zwieback, 2 oz.
Butter, 10 dr.
Raw beef, 4 oz.
Calories, 2491.

Thirteenth Day.

Milk, 6 oz.
Milk sugar, 3 dr.
Raw beef, 2 oz.
Zwieback, 1½ oz.
Butter, 6 dr.
8 A. M.: Eggs, 2.
10 A. M.: Milk, 6 oz.
Milk sugar, 3 dr.
Milk rice, 5 oz.
12 M.: Eggs, 2.
2 P. M.: Milk, 7 oz.
Milk sugar, 3 dr.
Raw beef, 2 oz.
Zwieback, 1½ oz.
Butter, 6 dr.
4 P. M.: Eggs, 2.
6 P. M.: Milk, 7 oz.
Milk sugar, 4 dr.
Milk rice, 5 oz.
8 P. M.: Eggs, 2.
10 P. M.: Milk, 8 oz.
TOTAL: Eggs, 8.
Milk rice, 10 oz.
Milk, 34 oz.
Zwieback, 3 oz.
Milk sugar, 13 dr.
Raw beef, 4 oz.
Butter, 12 dr.
Calories, 3007.

Fourteenth Day.

Milk, 6 oz.
Milk sugar, 3 dr.
Raw beef, 2 oz.
Zwieback, 2 oz.
Butter, 6 dr.
8 A. M.: Eggs, 2.
10 A. M.: Milk, 6 oz.
Milk sugar, 3 dr.
Milk rice, 5 oz.
12 M.: Eggs, 2.
2 P. M.: Milk, 7 oz.
Milk sugar, 3 dr.
Raw beef, 2 oz.
Zwieback, 2 oz.
Butter, 6 dr.
4 P. M.: Eggs, 2.
6 P. M.: Milk, 7 oz.
Milk sugar, 4 dr.
Milk rice, 5 oz.
8 P. M.: Eggs, 2.
10 P. M.: Milk, 8 oz.
TOTAL: Zwieback, 4 oz.
Butter, 12 dr.
Milk rice, 10 oz.
Eggs, 8.
Milk, 34 oz.
Milk sugar, 13 dr.
Raw beef, 4 oz.
Calories, 3073.

HEMORRHAGE FROM THE STOMACH.

As soon as hemorrhage from the stomach occurs the patient should be put to bed and not allowed to rise. A light ice-bag should be placed over the region of the stomach, and no food or drink whatever should be allowed; in order to quench the thirst, small quantities of ice may be given the patient to suck. Nourishment must be entirely by the rectum; but even this is usually unnecessary for the first few days. In order to combat the weakness following great loss of blood, salt solutions may be injected into the rectum, or if the patient is very weak, coffee, meat juice, or whisky may be added to the enema. In very grave cases salt infusions must be resorted to.

DIET IN CARCINOMA OF THE STOMACH.

In the dietetic treatment of cancer of the stomach milk forms the most important article of diet. The more easily digestible forms of meat, such as sweetbreads, scraped beef, calves' brains, and stewed chicken, are permissible. In this disease there is usually a distaste for meat, and fish may be substituted for it; of these, boiled mackerel, rock, haddock, or trout are to be recommended. Of the vegetables, mashed potatoes, spinach, carrots, peas, beans, cauliflower, if mashed and strained so as to rid them of cellulose, are admissible; rice, farina, and corn starch with milk are also valuable forms of food. Milk with tea, coffee, or cocoa, or wine or whisky may be given for the thirst. Fluids should, however, be taken in small quantities at a time. In order to supply the necessary quantity of fat, butter or Mehring's Vigor Chocolate is to be recommended. In these cases it is often important to promote the general nutrition by means

of rectal alimentation. In cases of cancer of the stomach too abundant a diet should not be insisted upon, as at best but little can be gained by this method of treatment. When the growth is at or near the cardiac portion of the stomach, the diet should be such as will prevent so far as possible any irritation of the diseased esophagus and stomach. Solids should therefore be avoided. Milk is the food that is usually best borne in this condition.

The authors have found the diet list given on the following page useful in many cases of cancer of the stomach:

		Calories.
8 A. M.:	150 gm. milk with tea	100.0
	50 gm. toast	130.0
10 A. M.:	100 gm. baked trout	106.0
	100 gm. milk or 30 gm. Panopeptone (57.5)	67.0
	10 gm. butter	81.0
	50 gm. toast	130.0
	50 gm. sherry	60.0
12 M.:	Bouillon with 5 gm. somatose	16.0
	100 gm. chicken	106.0
	or 100 gm. calves' sweetbreads (90),	
	or 100 gm. calves' brains (140),	
	or 100 gm. squab (100).	
	60 gm. macaroni	212.0
	100 gm. mashed potatoes	127.0
	or 100 gm. spinach (166),	
	or 100 gm. asparagus (18).	
	25 gm. stale wheat bread	65.0
4 P. M.:	50 gm. toast	130.0
	20 gm. butter	162.0
	40 gm. caviare	52.0
7 P. M.:	150 gm. milk (100) with 5 gm. somatose (16)	116.0
	100 gm. rice cooked in milk	177.0
	50 gm. wheat bread	130.0
9 P. M.:	30 gm. Panopeptone	57.5
		2024.5

DIET IN NERVOUS GASTRIC DISORDERS.

Nervous Vomiting.—This is often overcome merely by isolation and change of scene. In severe cases patients should be placed in bed; they are best fed on semi-solid or liquid food, since the latter is more easily retained

than solid food. It should be given in very small quantities; scraped beef, eggs, rice, and toast are especially useful. Cracked ice will often afford relief. The most indigestible forms of food are frequently well borne when the most digestible are speedily vomited. In severe cases the patient should be fed for some days exclusively by rectal alimentation.

Diet in Nervous Dyspepsia.—In this condition the diet should not be too restricted. Strengthening food, without any attempt at a too rigorous diet, should be prescribed. In those cases in which milk is well tolerated, it should be given in large quantities; when it is not well borne, buttermilk, kefir, or kumiss may be substituted for it. The patient's appetite should be humored, and he should be allowed to eat any food he can digest. Alcoholic stimulants should be prohibited, or given only in very small quantities. In severe cases a well-conducted rest cure will produce the best results.

CHAPTER XII.

DIET IN INTESTINAL DISEASES.

THE diet plays quite as important a rôle in the treatment of diseases of the intestine as it does in the treatment of gastric disorders. In many intestinal disturbances, such as acute intestinal catarrh, diarrhea, etc., cures often can be effected by diet alone, when without this mode of treatment the disease might become intractable. The diet in intestinal diseases, as in gastric disorders, must be such as will produce no annoying symptoms. The process of digestion in the intestine is exceedingly complicated, and therefore the digestibility of foods in this part of the alimentary tract is most difficult to determine.

It has been shown that certain forms of food contain very large proportions of protein matter, but that their absorbability is so slight that their nutritive value is far lower than that of foods containing less protein. Thus, while peas contain considerably more protein (7 per cent.) than does milk (3.7 per cent.), a much smaller proportion of protein is absorbed in the case of the former than in that of the latter; on the other hand, the absorbability depends greatly on the mode of preparation of the food; when vegetables are mashed and then strained, so as to rid them of their cellulóse envelopes, they are much more readily absorbed than when eaten with the cellulose. The digestibility of certain foods in the intestine varies

greatly with different individuals. For this reason exact rules can not be formulated in any case, but the diet must be varied according to individual peculiarities. Boas has expressed his opinion on this subject as follows:

"1. In a number of intestinal diseases a change of diet is unnecessary or may even be harmful.

"2. In some cases special dietetic restrictions are directly indicated, but these should be as few as possible.

"3. In another series of cases an abundant, heavy, not easily digestible or absorbable diet is indicated.

"4. The general aim of our treatment should always be to so manage the case before us that digestion of a normal diet will always occur in the alimentary canal without any subjective or objective disturbances. Under these circumstances only can the case be considered cured."

According to their effect on intestinal movements, foods may be divided into three classes: those producing constipation; those producing a laxative effect, and those exerting no especial effect in either direction. In the first class are those foods containing an astringent, such as tannin; among these may be mentioned certain red wines, cocoa, and tea. Rice, tapioca, barley, sago, macaroni, and potatoes have a tendency to produce constipation in many individuals. Among the laxative foods may be mentioned fruits and certain vegetables, as cucumbers, tomatoes, and cabbage; cider, buttermilk, beer, and the carbonated waters also exert a laxative effect.

In the third class, foods that have no especial effect on the intestinal movements, may be placed meats, fish, eggs, toasted bread, and zwieback. It must be remembered, however, that certain foods that prove laxative in one individual may be constipating in another, so that no

precise rules can be formulated; in each case individual tendencies must be consulted.

In severe forms of intestinal disturbances rectal alimentation must often be resorted to. For a further consideration of the technic and forms of food to be utilized in this method of feeding the reader is referred to the section on Rectal Feeding. In those cases in which food can not be given either by the mouth or by the rectum, subcutaneous feeding becomes necessary; for this purpose olive oil may be used; one ounce may be injected twice daily under the skin, best in the region of the thigh; in some cases normal salt infusions are indicated.

The management of the diet in intestinal disorders is often difficult. It requires great experience and judgment to determine what particular foods should be given the patient and also to know how long they should be continued. It frequently requires great tact and patience on the part of the nurse to see that the directions of the physician are carried out.

DIET IN INTESTINAL DYSPEPSIA.

In intestinal dyspepsia food should be given frequently and in very small quantities. At first only the liquid forms should be used, such as weak tea, peptonized milk, malted milk, bouillon, and egg albumin; after a few days the patient may gradually be placed on the following diet: calves' brains, sweetbreads, broiled steak or lamb chops, soft-boiled eggs, boiled fish, such as mackerel or rock; baked potatoes, spinach, asparagus, and stewed fruits.

The list on the opposite page gives the general plan of a diet used by the authors in this condition:

		Calories.
8 A. M.:	150 gm. milk with tea	101
	1 soft-boiled egg	80
	60 gm. toasted wheat bread (155) with 20 gm. butter (163)	218
10 A. M.:	Scraped-beef sandwich { 100 gm. scraped beef (118) / 50 gm. wheat bread (178) }	296
12 M.:	Bouillon with 5 gm. Armour's Soluble Beef	10
	100 gm. broiled chicken or 100 gm. broiled steak (209), or 100 gm. lamb chop (220).	106
	50 gm. mashed potatoes or 100 gm. spinach (166)	64
	100 gm. apple sauce	88
	50 gm. wheat bread, stale or as toast	130
3 P. M.:	200 gm. milk	135
7 P. M.:	200 gm. milk with rice	253
	1 soft-boiled egg	80
	100 gm. wheat bread and 50 gm. butter	666
		2227

DIET IN ACUTE INTESTINAL CATARRH.

As in acute gastric catarrh, so also in acute intestinal catarrh the regulation of the diet is probably the most important factor in the treatment of the disease. The patient should be kept in bed; after the bowel has been thoroughly emptied by a cathartic, liquid foods, such as clear broths—at first without and then with eggs—thin gruels, light tea, cocoa cooked in water, and egg albumin, should be given exclusively for several days. In this condition milk should not, as a rule, be given. When there is extreme thirst the carbonated waters may be allowed, but only in small quantities. The thirst is best relieved by placing bits of crushed ice in the patient's mouth. After the pain and discomfort have disappeared, toast, crackers, stewed chicken, soft-boiled eggs, mashed potatoes, and boiled rice may be added to the diet; indigestible foods, such as raw fruits, heavy vegetables, and fatty and acid foods, should be avoided for a considerable period of time after the catarrh has disappeared.

DIET IN CHRONIC INTESTINAL CATARRH.

The dietetic treatment in chronic intestinal catarrh depends upon the condition of the fecal movements; these are, in a measure, an index as to the portion of the bowel involved. Cases of chronic intestinal catarrh may be divided into those cases associated with chronic constipation, those associated with chronic diarrhea, and those in which diarrhea alternates with constipation.

Diet in Chronic Intestinal Catarrh Associated with Chronic Constipation.—In this condition a mixed diet containing, so far as possible, those substances that stimulate the intestinal peristalsis should be prescribed. Astringents and anything that tends to produce constipation, such as cocoa, chocolate, tea, red wines, rice, farina, etc., should be avoided.

The following foods should be prescribed in cases of chronic constipation: Graham and rye breads with butter, fruit, buttermilk, kefir, cider, beer, fresh vegetables, as cabbage; sour krout, and salads. Fats are especially to be recommended, and honey is also useful. Salts stimulate the intestinal movements, therefore foods containing salts are indicated in this condition; among this class may be mentioned herring and caviare. Sugar, especially milk sugar, has a marked tendency to increase intestinal movements. Water taken cold or on an empty stomach will also stimulate intestinal movements.

Diet in Chronic Intestinal Catarrh Associated with Chronic Diarrhea.—When severe symptoms, such as intense diarrhea and pain, present themselves the patient must be put to bed and kept on a very rigorous diet; the period of rest may be lengthened or shortened according to the severity of the disease. In

moderately severe cases several weeks will usually suffice. Nourishment should be taken in small quantities every few hours; sufficient must, however, be given to maintain the body weight. All cold drinks or carbonated waters, fruits, cabbage, and salads are to be avoided. The most suitable foods in this disorder are broths containing barley, rice, and farina; soft-boiled eggs, sweetbreads, stewed chicken, broiled steak, boiled fish, toast, crackers, baked potatoes, tea, milk (boiled), and cocoa; in many cases port wine is quite useful, as it contains tannin, which acts as an astringent to the bowels. In this condition milk, even when boiled, is often not well borne, and must then be avoided.

In conditions of chronic intestinal catarrh in which diarrhea alternates with constipation, the same plan of treatment may be followed as has been described for those cases accompanied by constipation or diarrhea; it is especially important to treat by diet the more prominent symptoms, whether it be diarrhea or constipation. Mineral waters are frequently utilized in cases of chronic intestinal catarrh. For cases accompanied by constipation the waters of Marienbad and of Saratoga (Congress and Hathorn Springs) are most beneficial. Where diarrhea is the prominent symptom, Carlsbad and Vichy are to be recommended.

DIET IN DYSENTERY.

The diet in **acute dysentery** is similar to that prescribed in acute intestinal catarrh. The patient is put to bed and only liquid foods are administered. Of these the most suitable are bouillon, broth, egg albumin, and tea; gradually, as the condition improves, semi-solids, such as milk toast, rice cooked in milk or broth, gruels

of tapioca, etc., may be prescribed. Solid food should be abstained from until a few days after the disorder has abated.

In **chronic dysentery** the food should be given in small quantities at frequent intervals. All coarse, indigestible food should be avoided. In other respects the diet is similar to that already given under Chronic Intestinal Catarrh.

DIET IN ULCER OF THE INTESTINE.

The diet in ulcer of the intestine is the same as that for ulcer of the stomach, and the reader is referred for the details to the section dealing with that subject. In cases accompanied by hemorrhage absolute rest in bed must be insisted upon, and rectal alimentation administered if necessary. In any form of ulcer the diet should be non-irritating and easily digestible. Among those foods that may be given are milk, eggs, rice, farina, sago, all forms of broth, especially chicken and mutton broths; sweetbreads, stewed chicken, baked potatoes, mashed potatoes, tea, cocoa, crackers, and toast.

DIET IN MALIGNANT GROWTHS OF THE INTESTINE.

The medical treatment in malignant growths of the intestine is only an adjunct to the surgical treatment always indicated, and consists solely in treating the symptoms as they arise. The diet should be highly nutritious and at the same time easily digestible; small quantities of food should be given at frequent intervals. Milk, broths, soft-boiled eggs, raw scraped beef, sweetbreads, baked and mashed potatoes, vegetables, such as carrots and peas, that have been finely divided and strained, stewed fruits, toast, and crackers are permissible.

DIET IN ACUTE INTESTINAL OBSTRUCTION.

The treatment of acute intestinal obstruction, except when due to the impaction of a foreign body, when it may possibly be passed through the bowel, is purely surgical. Previous to operation the following dietetic regulations should be carried out: The patient should be kept in bed, and in the acute attacks all food should be withheld. Thirst may be quenched by small bits of ice kept in the mouth or a few drops of hot water may be given at frequent intervals. If the disease extends over a period of several days, rectal alimentation or the administration of salt solutions must be resorted to.

DIET IN CHRONIC INTESTINAL OBSTRUCTION.

In this condition the diet should chiefly be liquid or semi-solid. All indigestible food should be avoided, especially those forms that are apt to leave a large amount of residue in the bowel. The foods to be avoided are salads, heavy vegetables, and fruits. Milk broths, eggs, broiled meats, chicken, sweetbreads, boiled fish, rice, farina, toast, crackers, and butter are permissible. In advanced cases rectal feeding must be carried out.

DIET IN APPENDICITIS.

The dietetic treatment in this disease must be governed by the symptoms, for surgical treatment is usually indicated. The patient should be put to bed and under no condition be allowed to rise until recovery is complete. During the first days Sahli and Penzoldt recommend that all food be withheld; liquids, such as egg albumin, weak tea, thin broth, barley or rice water, or milk diluted with lime water, may be given in small quantities when deemed necessary. When the acute symptoms have subsided

this diet can be increased somewhat; the milk may be taken undiluted and eggs may be added to the broth. When the pain and fever have disappeared entirely, gruels made of rice or barley, soft-boiled egg, scraped beef, stewed chicken, toast, and crackers may be added to the list; still later mashed potatoes and vegetables—finely divided and strained—may be allowed, and finally, when the patient is well, the usual diet may be resumed.

Ochsner advises the following plan of treatment in all cases of appendicitis in which operation is to be performed, believing that it reduces the mortality and changes the class of cases in which the mortality is greatest into another class in which the mortality is very small after operation:

"In every case of acute appendicitis all food by mouth and all cathartics are prohibited. In case the patient suffers from nausea or vomiting, gastric lavage is at once employed. In the milder cases the patient is permitted to rinse the mouth with cold water and to drink small sips of very hot water at short intervals. In the severer cases the patient is permitted to rinse the mouth with cold water, but is not permitted to drink either hot or cold water for the first few days until the acute attack has subsided, when the use of small sips of hot water is begun. If the nausea persists, gastric lavage is repeated once or twice at intervals of two to four hours, in order to remove any substance which had regurgitated into the stomach from the small intestine.

"The patient is supported by nutrient enemata, consisting of an ounce of one of the concentrated predigested liquid foods in the market, dissolved in 3 oz. of warm normal salt solution, introduced through a catheter which is inserted a distance of 2½ to 3 inches. In case

this gives rise to pain or irritation or nausea, it is interrupted for twelve to twenty-four hours at a time. In cases in which no water is given by mouth, an enema of 8 oz. of normal salt solution is given four to six times a day in addition to the nutrient enemata. In cases operated during the acute attack this treatment is continued for several days after the operation.

"After the patient has been free from pain and otherwise practically normal for four days he is first given from 1 to 4 oz. of weak beef tea, preferably prepared from commercial beef extract, every two hours. In a few days one of the commercial predigested foods, dissolved in water, is substituted; still later, equal parts of milk and lime water; then general liquids, then light diet; and finally, after the patient has fully recovered, full diet is given."

DIETETIC TREATMENT OF NERVOUS CONDITIONS OF THE INTESTINE.

This condition resembles nervous dyspepsia. At times the most indigestible food is well borne, whereas the digestible forms create discomfort; in each case it is important that the diet be regulated according to the patient's digestive powers. Generally a liberal diet is indicated in these cases; in many instances a systematic rest cure is needed to bring about relief.

Flatulence.—This condition is characterized by an excessive accumulation of gas in the intestine. In the dietetic treatment, therefore, foods that tend to produce large quantities of gas, such as beer, cider, carbonated waters, fruit, cabbage, rye and Graham breads, and potatoes, should be avoided. The disorder is often of purely nervous origin, and when this is the case unre-

stricted diet is to be recommended—one that will tone up the patient's system and thus cause the flatulence to disappear.

DIETETIC TREATMENT FOR HEMORRHOIDS.

Since constipation is often a frequent cause and accompaniment of hemorrhoids, it is important that this condition be corrected. As has been pointed out elsewhere, proper diet plays an important rôle in the prevention of chronic constipation. Patients afflicted with hemorrhoids should eat in moderation, but should avoid all excesses of food and drink. An abundance of outdoor exercise, consisting of walking and simple gymnastics, should be indulged in; violent gymnastics and horseback-riding should be avoided. A daily evacuation of the bowels should be secured. Patients with hemorrhoids should avoid alcoholic beverages, spiced foods, strong coffee and tea, cheese, cabbage, and beans. The foods most suited to this condition are potatoes, carrots, spinach, asparagus, and even salads, since they stimulate intestinal peristalsis and thus help to keep the stools soft. Stewed and raw fruits, including grapes, oranges, pears, and apples, are also beneficial. Water is the best beverage in this condition. The waters of Carlsbad, Kissingen, and Saratoga are most beneficial; they act best when taken at the springs.

DIETETIC TREATMENT OF DIARRHEA.

The dietetic treatment of diarrhea must vary according to the type of the disorder. In the nervous variety the patient should be instructed to restrain his bowel movements except at a certain hour in the morning. Under all conditions it is important to exclude from the

diet all foods that have a tendency to stimulate the intestines. Coarse, indigestible foods, especially those containing a large percentage of cellulose, must be avoided; in this class are especially to be mentioned cabbage, pickles, salads, turnips, carrots, all cold drinks, carbonated waters, and beverages (including champagne and beer). Among the foods to be recommended are broths, tea, red wines, farina, rice, and barley gruels. Raw milk usually has a laxative effect, but when boiled or diluted with lime water or brandy it is constipating, although in a certain number of cases it must be entirely excluded, as it increases the number of movements. In a number of cases of chronic diarrhea milk cures have been given with good results. The authors have succeeded in relieving cases of chronic diarrhea by systematic rest cure.

DIET IN CHRONIC DIARRHEA.

The Authors' Diet List for Moderate Cases of Chronic Diarrhea.

		Calories.
8 A. M.:	200 gm. of cocoa (cooked in water)	45.0
	2 soft-boiled eggs	160.0
	50 gm. toast	130.0
10 A. M.:	250 gm. broth with 1 egg	80.0
	30 gm. Panopeptone	57.5
12 M.:	250 gm. broiled chicken	212.0
	30 gm. toast	130.0
	200 gm. mashed potatoes	245.0
4 P. M.:	50 gm. Panopeptone	57.5
	1 soft-boiled egg	80.0
	200 gm. cocoa (cooked in water)	45.0
	50 gm. toast	130.0
7 P. M.:	100 gm. rice cooked in bouillon	34.0
	200 gm. sweetbread	180.0
	50 gm. wheat bread	130.0
9 P. M.:	100 gm. raw scraped beef	118.0
	50 gm. Panopeptone	57.5
	50 gm. toast	130.0
		2021.5

DIET IN HABITUAL CONSTIPATION.

In the dietetic treatment of habitual constipation it is essential that the food that is ingested should be such as will increase the intestinal movements. Those foods that leave a large bulk of fecal matter are useful for this purpose. Those that leave a small residue are most apt to produce chronic constipation. A diet consisting principally of eggs and milk with only a small quantity of vegetables and water is one that is constipating.

A glassful of cold water taken before breakfast will often regulate the bowels; occasionally, according to Penzoldt, a pinch of salt added to the water will increase its efficacy; raw or cooked fruit, taken on an empty stomach morning or evening, occasionally gives good results. It is a well-known fact that the smoking of a cigar in the morning will often stimulate intestinal movements. The patient should recognize the importance of having an evacuation of the bowels at the same time each day.

Chronic constipation is a frequent accompaniment of dyspeptic disorders, and may be relieved by appropriate treatment of the gastric disorder. It should not be forgotten that habitual constipation is frequently induced by the persistent use of cathartics, and the use of drugs should be avoided as much as possible in the treatment of this disorder. Sedentary habits are often the cause of constipation, and for this reason proper exercise should always be prescribed along with the dietetic treatment. The vegetables that are especially useful in the treatment of chronic constipation are spinach, peas, cauliflower, cabbage, asparagus, salads, onions, celery, and tomatoes. The cereals that stimulate the intestinal

movements are oatmeal and cornmeal. Graham, rye, corn, whole wheat, and bran breads are also useful. Other foods classed as laxatives are honey, cider, molasses, and acid fruits, such as apples, pears, peaches, cherries, and oranges. On account of the acids and seeds they contain, berries are effective laxatives. Prunes, dates, and figs are also to be recommended.

Habitual constipation is often due to the fact that water is taken in insufficient quantities; therefore, in the treatment of the disorder, an abundance of water must be prescribed. The foods to be avoided are tea, claret, cocoa, chocolate, rice, barley, and farina gruels, and huckleberries. In some cases milk acts as a laxative, whereas in others it has the opposite effect. For this reason its effect should be tested in every case. Boiled milk usually constipates. Buttermilk is preferable to sweet milk as a laxative. Most cases of habitual constipation can be relieved or cured by the dietetic treatment here laid down.

Boas[1] has recently called attention to the fact that in a certain class of cases of chronic constipation, excellent results are obtained by the rest cure. The patient is isolated for fourteen days and is not allowed to leave his bed. The nourishment of the patient is regulated for each day, and for each meal. No effort is made to increase the patient's weight, although great importance is attached to giving food regularly. The treatment is continued for from four to six weeks.

It is not within the province of this book to discuss the value of massage and electricity; suffice it to say that they are reliable adjuvants to the treatment of constipation.

[1] Boas, *International Clinics*, vol. iii., 14th Series, 1904.

The authors frequently prescribe the following diet in cases of chronic constipation:

		Calories.
6 A. M.:	40 gm. orange juice	88
8 A. M.:	300 gm. milk with coffee	192
	2 soft-boiled eggs	160
	150 gm. Graham bread	375
	40 gm. butter	326
10 A. M.:	400 gm. cider	280
12 M.:	200 gm. broth, with 1 egg	84
	100 gm. steak	214
	100 gm. carrots.	41
	100 gm. beans	193
	150 gm. Graham bread	375
	200 gm. stewed apples	106
4 P. M.:	400 gm. buttermilk	166
7 P. M.:	100 gm. scraped beef	118
	150 gm. Graham bread	375
	200 gm. stewed prunes	176
	300 gm. cider	210
9 P. M.:	40 gm. figs (or 400 gm. buttermilk)	46
		3525

DIET IN PERITONITIS.

Acute Peritonitis.—The diet in acute peritonitis is purely of secondary importance and requires consideration only until operative procedure can be undertaken. No food whatever should be given by the mouth; if necessary, rectal alimentation should be resorted to. If operation is not undertaken and vomiting has ceased, fluids may be given in a few days. Foods that may be prescribed are milk and lime water, diluted broths, and egg albumin with or without brandy or sherry; only very small quantities should be taken at a time, but at frequent intervals; gradually plain milk, broth, and gruels may be added to the list; solid food should not be allowed for several weeks. When stimulants are required they should be given in the form of whisky, brandy, or champagne.

Chronic Peritonitis.—The diet in chronic peritonitis should consist of boiled meats, eggs, milk, stale bread, toast or crackers, and vegetables, only, however, in the form of purées; carbohydrates should be eaten sparingly on account of their tendency to ferment. Food should be eaten in small quantities at regular but frequent intervals.

CHAPTER XIII.

DIET IN DISEASES OF THE LIVER.

CERTAIN general principles of dietetics apply to all diseases of the liver. The condition usually called "biliousness" is a cry of the liver for relief from overwork. The administration of calomel or a saline laxative followed by a few days of restricted diet is all that is necessary in most cases. In general it may be stated that in diseases of the liver the food should be easily digested and consist of a mixture of proteins, carbohydrates, and fats. In many cases it is desirable to limit or even to avoid altogether both fats and carbohydrates.

Certain articles of diet are known, while others are believed, to be injurious in diseased conditions of the liver. Overeating is injurious; first, on account of the overwork it necessitates; and secondly, because the superfluous food is apt to undergo putrefaction. The resulting bacterial products are believed to act on the liver in much the same manner as does alcohol. The excessive use of alcohol produces marked changes in the liver in certain individuals.

In all liver diseases alcohol should be avoided unless specially indicated as a tonic or stimulant. In any case it should be given well diluted. A well-matured pure whisky well diluted with water is to be preferred, and this is only in the smallest possible amount.

Certain foods have been regarded as "stimulating" or "irritating" to the liver. Among these are peppers of various kinds, spices, mustards, concentrated meat ex-

tracts and meat broths, and the substances formed in roasted and baked meats. To be proscribed are peppers, radishes, horseradish, onions, watercress, and celery. Salt in too large quantities is also to be condemned. Strong coffee and tea are harmful, but weak tea seems to be well borne in many cases.

In severe diseases of the liver the diet must usually be restricted to milk, diluted or peptonized; gruels, albumin water, kumiss, buttermilk, and bland broths, such as oyster broth. Orange juice as well as lemonade may generally be allowed.

In the milder diseases and during convalescence the diet need not be so rigid, and lean meat, curd, junket, bread, toast, zwieback, fresh fruit, or stewed fruit with little or no sugar, may be allowed. In the chronic cases and lighter forms the following articles may help to make up the dietary: Milk, variously diluted and prepared; buttermilk, curd, kumiss, custard, junket, eggs, lean meat—if beef or mutton, preferably rare—sweetbreads, chicken, squab, liver, the soft part of oysters and the more digestible forms of fish. Fresh green vegetables and green salads without oil are permissible. Small quantities of well-baked or boiled mealy potato may be allowed once a day, for many persons do not relish a meal that does not contain potato in some form. The starchy foods should be partaken of somewhat sparingly; bread, toast, zwieback, pulled bread, and biscuits (crackers) may be permitted. Small quantities of cereal foods may be taken; rice, sago, and tapioca, when sufficiently well cooked, may be allowed. Fresh fruit is a valuable adjunct to the diet. Oranges, grape-fruit, ripe peaches or pears, strawberries, ripe plums of the most tender varieties, may all be taken. Stewed fruits only slightly sweetened and baked apples may be allowed with advan-

tage. If there is constipation, stewed prunes are useful. Lemonade may be taken as a beverage.

Mineral waters may be drunk freely if dropsy is not present, and are best taken on rising and between meals. Hot water is a valuable substitute for the mineral waters. It is especially useful in allaying thirst when there is dropsy.

The food should be taken slowly, well masticated, and never in too large quantities. If necessary, more milk may be given, so as to make large amounts of other food unnecessary. The patient should lie down directly before and after meals. In no case should the patient eat immediately after taking active exercise.

In certain chronic conditions, such as hyperemia, fatty degeneration, and chronic hepatitis, exercise is to be taken at proper times.

In summer and in warm climates more vegetables are to be allowed and less meat. If putrefactive changes take place in the intestine, a diet consisting of white of egg and water should be maintained until this condition is overcome. When the putrefaction is caused by torpidity of the liver, it may sometimes be prevented by increasing the amount of vegetables and by the use of laxatives.

Diet in Gall-stone Disease.—The meals should be taken at regular intervals and not too widely separated. Prolonged fasting should not be permitted. A substantial breakfast should be taken when not otherwise contra-indicated, and not the simple "continental" breakfast of coffee and a roll. A late supper is of value, and it may be advisable in some instances to give the patient nourishment at night. Fat should be reduced to a minimum or avoided entirely, and the starches and sugars limited in amount.

CHAPTER XIV.

DIET IN DISEASE OF THE RESPIRATORY ORGANS.

Pleurisy.—Two plans of dietetic treatment may be followed. The first is to place the patient on a milk diet. The second is to place the patient on a "dry diet." This consists of the ordinary diet with the fluids limited in amount. No soups, but little tea or coffee, are allowed, and but small amounts of water. The milk diet is preferred where there is fever or complicating heart or kidney disease.

Empyema (*Pus in the Pleural Cavity*).—As nourishing a diet as is possible should be used according to the general principles of feeding fever patients.

Laryngitis.—In chronic disease of the larynx there may be great pain on swallowing. All hard and highly seasoned foods are to be avoided. Only semi-solid and liquid foods should be given. The physician sometimes prescribes drugs to allay the irritation in the throat at meal time.

Difficulty in swallowing may sometimes be overcome by the following two methods: By allowing the patient to lie flat on a lounge with his face over the edge. Food is to be sucked through a tube from a vessel placed immediately below. The second method consists in directing the patient to lean forward while eating.

Asthma.—Certain forms of asthma may be brought on by errors in diet leading to attacks of indigestion.

Patients suffering from this should partake only of easily digested food and should lead regular lives. The meals should be taken at regular intervals. Dinner should be eaten in the middle of the day and the supper should be light. Late suppers should not be taken, and eating between meals should not be allowed.

Diet in Chronic Lung Disease.—In all chronic diseases of the lungs the diet should be as easy of digestion and especially a diet which will not cause flatulence, as this pushes up the diaphragm and interferes with breathing. (See Diet in Diseases of the Heart.)

Pneumonia.—The diet in pneumonia is of the greatest importance. The patient's recovery often depends upon the matter of his being well nourished.

The same general principles of feeding should be followed as are indicated in all acute fevers. During the course of the disease the patient should receive an abundance of water in addition to the liquid food supplied. Plain water or any carbonated water that the patient may desire should be given. Milk and seltzer may be allowed freely. Lemonade or orangeade, or water flavored with tamarinds, may serve to lend variety. The " Imperial drink " (the recipe for which appears at the end of this book) may also be given.

During the height of the disease milk should form the basis of the diet. This may be peptonized or diluted with lime water. Albumin water, wine whey, malted milk, beef juice, Eskay's food, and similar preparations may be employed when milk is not well borne. Predigested liquid beef preparations may be used both for their stimulating effects and as a food. They should always be diluted freely with water unless, because of vomiting, a concentrated food is indicated.

Food should be given at regular intervals of from two to four hours, according to the patient's condition and the amount he is able to take at one time.

Constipation, flatulence, and vomiting are to be avoided whenever possible. If they do occur, efforts should at once be made to relieve the condition.

In most cases starches and sugars are best omitted from the diet. Fruit may be allowed at any time during the disease, and is of special benefit during convalescence. Most grateful during the severe stage are orange juice, lemonade, grape-fruit, and grapes. During convalescence ripe peaches or pears in season may be added to the diet. The return to a general diet should be made gradually, and no solid food should be allowed until the fever has subsided. Then the general dietetic rules for convalescents may be followed.

Alcohol is given only according to the directions of the physician.

CHAPTER XV.

DIET IN DISEASES OF THE CIRCULATORY SYSTEM.

DIET IN DISEASES OF THE HEART.

General Directions for Diet.—The diet for patients with heart disease usually requires considerable attention. In general there are two stages of heart disease. The first is called "the stage of compensation," when the heart, although diseased, is still able to pump the blood through the body. The second stage, or "stage of broken compensation," is when the heart, no longer able to cope with its work, is unable to force the blood through the vessels as it should and there is a certain amount of damming back of the blood. This causes numerous unpleasant symptoms, such as edema, difficulty of breathing, and irritability.

During the first stage the diet requires comparatively little attention beyond the observance of certain general rules. When the second stage is approaching the diet should be carefully supervised, for the patient may be spared much suffering, and often the time of the broken compensation postponed.

The meals should be small; more should never be given than the patient can easily digest. If the stomach is overloaded the diaphragm is pushed up and displaces the heart, and this may occasion palpitation and dyspnea. If the meals are too large the residue of any digested food in the intestine may undergo fermentation and

cause flatulence, with its attendant disagreeable symptoms.

The meals should be simple and well cooked. Improperly prepared food is a cause of indigestion, and may produce flatulence or discomfort. The food chosen should be of a kind that is easy of digestion. A sufficiently long interval should be allowed to elapse between meals, and eating between meals should be strictly prohibited, as even small portions of food taken when digestion is in progress may give rise to flatulence in these patients.

The meals should all be of equal size; while the evening meal may be a little smaller and lighter than the others, and the principal meal should be taken at midday, there should, as has been said, be but comparatively little difference in their size, and the patient should be instructed carefully in this regard.

The amount of fluid taken should not be too large, nor, on the other hand, should it be too small. When compensation has been lost, the question as to the amount of fluid to be taken becomes of much importance. At no time should it be forgotten that fluids distend the vessels, raise arterial tension, and increase the work of the heart. If the quantity of fluids given be too small, elimination is delayed and the irritative effect of the retained impurities in the blood proves harmful. Fluids should be taken between meals and are best sipped slowly. Weak tea and coffee may be allowed in small quantities between meals; if they do not cause flatulence, however, they may be allowed at meal times, but always in great moderation.

Alcohol is best avoided. If, owing to the general weakness of the patient, its use is indicated, it should be

given in small quantities, and in the form of pure whisky or brandy well diluted. Wine and beer are contra-indicated.

In general it may be said that a diet of plainly prepared food, unencumbered by too many restrictions, is best in these cases.

All highly seasoned food and the condiments in general should be omitted from the diet, as they tend to stimulate the appetite of the patient and may cause him to take more food than is necessary or desirable.

Stews and fancy dishes should also be omitted, as should the foods usually classed as difficult of digestion, such as fried foods and the like.

Starches, sugars, and fats should, as a rule, be reduced ; this restriction, however, should be enforced strictly only when made necessary by complicating stomach disorders coming on as compensation ruptures, when they are apt to cause fermentation and flatulence.

Broadbent dwells on the necessity for giving a diet containing about the usual proportion of food constituents. Starches and vegetables are useful additions to the diet, as they help to keep it from being too largely nitrogenous. If too much protein material is taken it is imperfectly oxidized, and the waste accumulating in the blood increases the work of the heart, just as when too much food is taken.

The diet should consist largely of milk and of dishes made from this food; eggs, rare meats, especially mutton and beef; poultry, fish, and oysters. Well-baked bread, rolls, or biscuits, which are never to be eaten warm, and cereals in moderate quantities may be allowed. Well-cooked potatoes, spinach, asparagus tips, cauliflower tops,

and other similar vegetables may be taken, all stalks being avoided.

The diet list should be simple and such as will not require complicated directions.

As compensation becomes impaired, numerous disorders of digestion occur and require care and attention. The patient with heart disease may develop a distaste for food, and this will often tax the ingenuity of the physician.

As blood-stasis sets in, constipation is apt to occur. Hypostatic congestion of the liver comes on, causing lessened metabolism, and consequently interfering greatly with the general nutrition. The stomach and intestine are affected and a chronic catarrhal condition of both is generally present.

The quantity of fluid given should now be regulated carefully, neither too much nor too little being given. A glassful of Vichy half an hour before eating will help to prepare the stomach for a meal, and will, as a rule, be excreted promptly. Fluid is absolutely necessary for metabolic changes, and may be taken in the form of the "Imperial drink," elsewhere described, between meals. A glassful of hot water flushes out the body, and as it is rapidly excreted does not add materially to the amount of fluid present.

In the **Oertel treatment** of heart disease the fluids are allowed only in a very limited degree. If the patient is on a milk diet, other fluids besides milk should be given in comparatively small quantities.

If **edema** is severe the food may be given in as concentrated a form as possible.

If **flatulence** is troublesome, fats, starches, and sugars, as well as beer, pastry, and stews, are to be avoided. No solid food should be taken between meals. Coffee or tea

taken with the meals may give rise to flatulence. They may, however, in some cases be taken during the day, at a time when the stomach is empty; they should be freshly prepared and should never be strong. Only such quantities of food as the patient can digest should be allowed, and if necessary digestion may be aided by giving essence of pepsin or other digestives. In some cases a milk diet may become necessary.

Sudden dilatation of the heart occurring during or following any acute disease requires rest and a milk diet.

Palpitation and **dyspnea** are often caused by the ingestion of too abundant meals; if persistent the food should be given in smaller quantities and at shorter intervals. Four or five small instead of three large meals may be taken at regular intervals, or a milk diet may be ordered for a time. The general management may be such as has been suggested for flatulence. Tea, coffee, and tobacco should be avoided, and effervescing drinks may also be omitted. If there is constipation, stewed fruits, especially prunes or figs, are useful.

Gastric disturbances are best met by rest and a milk diet for a time, with a gradual return to the ordinary diet or a diet such as is advised for cases of gastric catarrh. Much relief frequently follows the drinking of a glassful of hot water or of Vichy half an hour before a meal.

As **ruptured compensation** is accompanied by effusion, something must be said with special reference to the removal of fluids from the body. Here, indeed, feeding is a difficult task, for the patient usually has a disgust for food. If the patient is very ill, nourishment may be administered every three hours. If he is able to be about, it will often be well to allow him to take his meals with the family at the regular meal time. He may be given

chicken, tender meats, fish, oysters, and other forms of light food. When but little is taken at the regular meal time, food may be given between the meals at regular periods, time being allowed for complete digestion to take place. Milk, albumin water, egg and milk, soup, or beef tea in small quantities are useful for this purpose. Broadbent recommends meat or chicken jelly or meat extracts for their stimulating effect on the heart. Potted-meat sandwiches or meat pulp, prepared as directed for tuberculosis patients, may be given.

Fluids other than milk and soups should be taken in as small quantities as possible. "Imperial drink" or hot water, as previously suggested, may be given to quench the thirst.

Stimulants are usually needed, but should be given only under the supervision of the physician, as there is a tendency to take too much to relieve faintness or other symptoms. In non-alcoholics, from ½ to 2 oz. of whisky a day may be allowed at the beginning, the amount being increased as occasion demands. Stimulating drugs have largely superseded the use of alcohol in these cases.

Aneurism; Dilatation of the Blood-vessels.—Special diets are sometimes prescribed for these patients. Tuffnel's diet, which restricts the foods to a very small quantity and enforces absolute rest, is the best known. Whether or not such diets should be used is a matter to be decided only by the most expert knowledge.

Angina Pectoris.—Small easily digested meals are to be given according to the general rules for dieting heart disease.

Anemia.—There are a number of different kinds of anemia, and the diet depends somewhat upon the form present. That following the loss of blood is usually

rapidly recovered from. In this form infusions of salt solution are sometimes given.

In general it may be stated that anemic persons require fresh air and sunshine and good food. Fresh food, milk, eggs, meats, green vegetables, and fresh fruits are the most important articles of diet. The meals should be given at regular intervals and not too widely separated, usually about three hours apart. The meals should be small. Eating between meals should be absolutely prohibited, and this may require some watching, as the patient frequently has a very capricious appetite, eating all sorts of indigestible articles between meals and leaving the regular food untouched. The breakfast should be a good, nutritious one and consist of meat or eggs in addition to other articles of food. Milk is valuable, but should not be given to the exclusion of other food. It is a good plan to have it taken toward the close of the meal, as otherwise the patient may spoil his appetite by drinking a glassful of milk at the beginning of the meal. Rest before and after meals is desirable.

CHAPTER XVI.

DIET IN DISEASES OF THE GENITO-URINARY SYSTEM.

Urine and Food.—The urine bears a direct relation to the quality and quantity of food ingested, as well as to the quantity of fluid taken and the amount of work done by the individual. Many variations occur in the urine that are due to food or drink and that are normal. When the kidneys are diseased improper food may bring on dangerous or even fatal complications.

One of the first principles of dieting persons with diseases of the kidneys is to avoid giving them food which is irritating to the kidneys. Among these may be mentioned the browned outer surfaces of grills and roasts, strong sauces, spices, pastry, very acid foods, strong alcoholic drinks, and strong tea and coffee. Green vegetables are to be avoided in acute diseases of the kidneys, as well as cranberries and fruits which contain kernels. As regards meats in the acute conditions, they are to be avoided until ordered by the physician. There is a popular idea that the light meats are less injurious than the dark ones; this has no foundation. Glands, such as liver, sweetbreads, kidneys, and spleen, should be avoided. Strong meat broths are also injurious.

Alcohol is to be avoided in all cases except when prescribed by the attending physician. All alcoholic beverages are irritating to the diseased kidneys, and if

anything they are more injurious in the chronic cases than in the acute.

Water may be given freely in all cases where the urine is increased with the increase in the amount of water taken. It aids in the elimination of waste products. When, however, the amount of urine is greatly diminished or none at all is passed, the physician should regulate the amount of fluid that is given the patient, as there may be danger in giving too much.

Acute Inflammation of the Kidney; Nephritis. —During the first stage of the acute condition in the severer cases food is given in very small quantities, a pint of milk a day. To relieve the thirst, tablespoonful doses of water may be given or pieces of ice may be placed in the mouth. In this stage the physician frequently prescribes some form of alcoholic stimulant.

In the less severe cases a strict milk diet is followed, or, what is generally preferred, 1½ quarts of milk is given with about ⅛ pint of cream. Rice, groats, cornmeal porridge, crackers, and zwieback may be added if the patient has any appetite, and butter, sugar, and grape juice or other fruit juices may be given. Plain or carbonated waters, the "Imperial drink," weak lemonade, buttermilk, and similar drinks may be given. As convalescence advances calves'-foot jelly and similar preparations are allowable. Light vegetables may be added to the diet; spinach is perhaps the best, but cauliflower tops, young peas, or young string-beans may be used. In acute cases and their convalescence the patient's appetite is a fairly good guide as to the amount of food to be taken. Meat and eggs are to be added to the dietary last of all. For a long time after an attack of inflammation

of the kidneys the patient should avoid the articles of food which are irritating to the kidneys.

Chronic Inflammation of the Kidneys.—In this disease the diet should be very much like that suggested for old people. (See Diet for the Aged.) Alcohol is to be avoided, as are tea and coffee and all the foods set down as irritating to the kidneys. The amount of fluid taken should not be excessive. There is a popular idea that in this disease the more fluid one takes the better; this is not true, and in some cases excessive amounts of fluids are distinctly injurious. An occasional drinking-day or drinking-week is sometimes allowed, during which the patient drinks large quantities of water to flush out the system. This is frequently accomplished by an occasional visit to a watering-place, where the change of scene is often of as much value as the waters. Exercise, fresh air, freedom from care and worry, suitable occupation, and pleasant surroundings are all important. A change of air to a dry, warm climate is often of great benefit.

Another point to remember is that many drugs are injurious to the kidneys, and the taking of indiscriminate headache powders and other things without a knowledge of what they do or of what they contain is a habit which, if for no other reason than protecting the kidneys, is to be most highly condemned.

Movable and Floating Kidney.—This trouble is sometimes seen after rapid loss of flesh from any cause. A rest or careful feeding to regain the original weight is in many cases of great service.

Calculous Affections.—The tendency to stone formation, as in the kidney or bladder, and the much-talked-of condition usually called the uric acid diathesis, may be considered together.

In many instances, but by no means all, too rich food, too large meals, and too little exercise are at the bottom of the trouble.

The following suggestions regarding the diet will be found useful: Avoid strong drinks, and all alcohol if possible; much meat, and especially the nuclein-containing meats, as thymus, spleen, liver, brain, caviare, etc., smoked, pickled and spiced meats, and rich foods in general. The fats and sugars as well as the cereals should be restricted. The diet should be made up of the plainer, well-prepared foods, and so far as possible a vegetable diet should be prescribed. Water, especially the alkaline mineral waters, may be allowed in abundance. A sojourn at Carlsbad may be recommended for certain obese patients.

Mineral waters must be used with extreme caution, for if too much alkaline water be taken it may increase the deposit of certain earthy salts. The physician should direct the kind and amount of such waters as are to be taken.

SURGICAL DISEASES OF THE GENITO-URINARY TRACT.

The directions for diet are very simple. All irritating foods and drinks should be avoided, as should all indigestible articles. The diet should consist of plain and wholesome food. Where it is possible, skim-milk should form the basis of the diet. Too much meat should not be taken, and twice-cooked meats and fried and very greasy foods avoided so far as possible. Carbohydrates, as breadstuffs, cereals, and the non-acid vegetables, may be allowed. Care should be taken to avoid all complicated and highly seasoned foods, all pepper, spices,

and salad dressing. In a word, everything previously mentioned as irritating to the genito-urinary tract should be avoided. Acid fruits, asparagus, and tomatoes are also to be forbidden. Tea and coffee should be prohibited or given very weak and well diluted with milk or cream. All alcoholic drinks should be forbidden.

CHAPTER XVII.

DIET IN DISEASES OF THE NERVOUS SYSTEM.

THE necessity for the correct management of the diet in nervous diseases is becoming appreciated more and more every year. As a general rule, it may be stated that all functional diseases attended with emaciation are greatly benefited, if not entirely relieved, by merely increasing the patient's weight by such methods as are suggested under the heading of Rest Cure. Patients with chronic lesions will, as a rule, be made more comfortable if the following two points are borne in mind: First, to overcome, so far as possible, emaciation and anemia where the nutrition has a tendency to be below normal; and secondly, and of no less importance, to prevent undue obesity in those so inclined, particularly where there is disturbance of locomotion. A patient may be condemned to remain in bed or in a chair on account of the excessive weight which his inactivity has fostered.

Most patients regard diet as a very unimportant part of the treatment; this is especially true of those cases that most need careful feeding. The necessity for careful dietary should be impressed upon these patients, and a faith in its efficacy engendered where the disease is of a functional nature.

The diet suitable in nervous diseases has been the

subject of many diverse opinions, particularly in the minds of the laity. Fish has been vaunted as a "brain food," and various fats or cereals have been suggested for nervous conditions. At the present time, it may be stated, there is no specific "nerve food." The nutrition of the nervous system will be good when the patient's general nutrition is good, and *vice versâ*. Both in functional disorders of the nervous system and in the psychoses dependent upon exhaustion the improvement of the general condition should be the first care.

The basis of the diet is usually milk. Care should be taken to see that the patient gets sufficient fluid, and where no tendency to obesity exists water should be taken with each meal, and usually at bedtime and on rising. It may also be taken between meals if desired. When there is disturbance of digestion, it is a good plan to prepare the stomach for the meal by sipping a glassful of hot water on rising and an hour or less before each meal. The mineral waters may be used when desired; the alkaline ones are apt to be of most value. Carbonated waters should be used with care, lest the flatulence they may cause give rise to symptoms the importance of which may be greatly exaggerated by the patient.

A question of great importance is whether or not alcohol should be used. As a general rule, it should not be allowed. In cases with chronic lesions, where the patient has been accustomed to the use of alcohol all his life, it may be allowed if not otherwise contra-indicated, as in a tendency to cerebral hemorrhage, arteriosclerosis, chronic interstitial nephritis, and the like. The use of alcohol in the functional disorders is usually contra-indicated. Its value as a food and as a stimulant to nutrition should not be overlooked, and it may be used

with great benefit in the psychoses accompanied by exhaustive conditions.

NEURALGIA.

Some cases of neuralgia are directly caused by indiscretions in diet; other cases depend on a lowered state of nutrition, while still others may be due to plethoric states. Neuralgia is also caused by many factors not related to the diet of the patient. To decide this question requires great experience and judgment on the part of a skilled physician.

As a general rule, plain, wholesome food should be ordered at regular intervals. The patient should not be allowed to eat between meals. All rich, complex, and highly seasoned foods should be forbidden, as should all fried foods, pastry, and anything known to disagree with the patient. Care should, however, be taken that the diet be not restricted, for the patient's ability to take different articles is often purely imaginary. True idiosyncrasies for different articles of food are not very common. The excessive use of tobacco may be the cause of neuralgia.

INSOMNIA AND DISTURBED SLEEP.

When not dependent upon other conditions, these are apt to be due either to eating at night or to a depressed state of the nutrition. For the first there is nothing to do but to discontinue the habit of eating at night. There are but few persons who reach middle age and can eat late at night with impunity, and sooner or later the individual learns that he must give up the habit. There are some, however, with whom the practice seems to agree.

When the trouble is caused by malnutrition or anemia, the general condition of the patient must be treated. Good food, regular hours, milk or some light food between meals, and on going to bed a cupful of hot milk, cocoa, or, if preferred, beef tea, malted milk or similar preparation may be ordered.

In many cases where the nutrition is fairly good one of the hot drinks just mentioned taken at bedtime may be all that is necessary. This is especially true of the insomnia and disturbed sleep that follow the doing of mental work at night. The effect is to dilate the abdominal vessels and to restore the equilibrium of the circulation. A brisk walk in the open air or five minutes' exercise will often accomplish similar results.

EPILEPSY.

Epilepsy bears an important relation to diet. There is no specific "anti-epilepsy" diet, and there is no form of food that can be assigned as a cause of epilepsy; it is, however, a fact that where the diet is carefully regulated, the number of attacks are usually lessened. This is particularly true of children. The principle involved is to give only as much food as the patient can easily digest and assimilate, and to allow sufficient time to elapse between feedings for him to utilize and excrete the end-products of what he does assimilate. When this is not done, attacks may be provoked by irritating substances in the bowel, by the absorption of toxic substances from the intestinal tract, or by the accumulation of the products of metabolism in the body. In the epileptic colonies no especial diet is used, but the amount and the variety of food are so regulated as to secure the best results.

In children a diet composed largely of milk, with the addition of cereals and fruit, is most useful. In older persons this diet is not feasible except occasionally as a temporary measure. For these latter meat should be allowed only once a day, unless on account of excessive manual labor or because of a weakened condition of nutrition the patient especially demands it. Milk, cereals, bread, vegetables, and fruit should make up the rest of the dietary. Each patient should be instructed to take only digestible food, to take his meals regularly, and not to eat too much. They should also be taught to eat slowly and masticate the food well. The avoidance of constipation is of primary importance, and this can usually be secured by the proper use of fruits and the coarser forms of cereals.

Quiet, open-air life, pleasant occupation of a non-strenuous kind, an absence of worry, and agreeable forms of recreation are just as important as the diet in these cases.

CHOREA.

In chorea the diet is often of the greatest importance; this is especially true when it occurs in anemic or debilitated children. Rest and an easily assimilable diet are the indications. The authors are of the opinion that absolute rest in bed, if possible isolated from the remainder of the family and under the care of a trained nurse, who should be a stranger, combined with a milk diet or a diet composed largely of milk, will give better and more lasting results than any other form of treatment. If the patient is anemic, beef juice made from fresh beef may be used to advantage, as well as raw scraped beef and similar foods.

APOPLEXY.

Comatose Stage.—During the early stage of the comatose condition—*i. e.*, for the first day or two—there is, as a rule, no necessity for giving the patient any food. As the disease is most likely to occur in obese, overfed individuals, the abstinence from food is often beneficial. The intestinal tract should be flushed out as soon after the patient is seen as is practicable. Those about the patient should be instructed carefully as to the dangers of attempting to feed the patient if he is unable to swallow, for he may, on the one hand, choke, and, on the other, he may draw food or drink into his lungs during inspiration, and so set up a pneumonia.

If the patient is in need of nourishment or of fluid, it may be given by the rectum. Normal salt solution may be given by the rectum to supply the body with fluid, but it should not be given in too large quantities. (See Rectal Feeding.)

Later Stages.—As soon as the patient recovers sufficiently to be able to swallow without danger of inspiring the food he may be fed by the mouth. The food should be liquid or semi-solid, and of a bland, unstimulating character. The quantity should not be too large. Milk, milk and eggs beaten together in the form of a milk punch, without, however, the addition of a stimulant; broths, soft eggs, and milk thickened with cereals, or the purées of vegetables may be used. As the patient improves other food may be added, but the diet should be light, easily digestible, and as non-stimulating as possible. The patient should be warned against overeating and also against drinking. Alcohol is allowable only in the case of habitués who are threatened with collapse

unless it is used, or in the same class where food is not assimilated without it. It should always be given in moderate amounts, and the dosage arranged by the physician, and never left to the nurse, the patient or the family.

On account of the lack of exercise the diet should contain but little meat, but cereals, vegetables, and fruit should be given in small quantities at a time, and as evenly distributed throughout the day as possible, to avoid overfilling of the vessels.

The greatest danger, from a dietary standpoint, is in those patients who recover sufficiently to return to their ordinary modes of living. They should be very carefully instructed neither to drink to excess nor to overeat. A full meal and several drinks may be the cause of a second or of a fatal attack.

ALCOHOLISM.

The mild forms of alcoholism are usually easily managed. So long as the stomach is irritable it should be given absolute rest. If possible, alcohol should be withheld entirely. As soon as the stomach will retain fluid a saline mineral water or a saline purge should be given. Milk or bouillon is next to be prescribed, and as the desire for food returns a light diet of soft-boiled eggs, milk toast and the like should be allowed. After recovery all rich and highly seasoned food should be avoided, particularly the spices and peppers, which are commonly used to excess.

In the severe forms the diet should be that recommended for chronic gastritis. Some confirmed alcoholics can retain nothing in the stomach until they have had their morning drink. When nutrition is threatened this may

be allowed, but it is apt to lead to excesses later in the day.

In the very severe forms, as in delirium tremens or in cases approaching it, the patient should take as much fluid as possible to flush out the system, and the intestinal tract should be thoroughly purged. The food should be given in a predigested or in a partially predigested form and at frequent intervals. In this way the craving for drink is somewhat alleviated. Bouillon or beef tea to which considerable amounts of black pepper or even Cayenne pepper have been added is useful in this condition, although their use would be contra-indicated for any but an alcohol-saturated person. Rest and suralimentation as soon as food can be borne constitute the best method of managing these cases. Strychnin may be used as a stimulant.

Illness or Injury in Alcoholics.—When a man who has been accustomed to taking several glasses of spirits every day for years is suddenly stricken ill or injured, delirium will often develop if the stimulant is rapidly withdrawn. In all such cases the accustomed amount of alcohol should be given, care being taken, however, to prevent overindulgence.

In alcoholics affected with pneumonia alcohol is necessary to sustain life. When delirium occurs in the course of pneumonia alcohol should be ordered, although in ordinary, uncomplicated cases of delirium tremens due to extreme overindulgence it should be withheld.

REST CURE.

The technic of the treatment is explained in a most interesting way by Mitchell, in his book " Fat and Blood."

The more nearly perfect the technic and the more closely it is adhered to, the more likely is cure to follow. The cases are of various grades of severity, and the treatment is modified to suit the individual. Isolation is necessary, and the patient should be removed to a hospital or a sanitarium, away from familiar scenes. Home treatment does not succeed well. If circumstances compel the patient to remain at home, her room should be changed. In severe cases with emotional manifestations visiting is forbidden, but it may be allowed to a "certain extent when the patient is anemic owing to a distinct cause, as overwork, blood-losses, dyspepsia, low fevers, or nursing." The nurse should be a stranger to the patient.

Communication with friends and family should, as a rule, be cut off entirely, and not even the reading of letters should be allowed. After several weeks, if the patient is improving, she may be allowed to read the newspaper each day.

Rest is a most important feature, and, as a rule, the patient should be put to bed for six weeks or two months.

In other cases, especially where the patient is not able to undergo regular treatment, as in dispensary cases, a modified rest cure may be tried. The following is Mitchell's schedule for such cases; this may be modified according to circumstances:

"7.30 A. M.: Cocoa, coffee, hot milk, beef extract, or hot water. Bath (temperature stated). Rough rub with towel or flesh-brush. Bathing and rubbing may be done by attendant. Lie down a few minutes after finishing.

"8.30 A. M.: Breakfast in bed. (Detail as to diet. Tonic, aperient, malt extract as ordered.) May read letters, papers, etc., if eyes are good.

"10 to 11 A. M.: Massage, if required, is usually ordered one hour after breakfast, or Swedish movements are given at that time. An hour's rest follows massage. Less rest is needed after the movements. (Milk or broth after massage.)

"12 M.: Rise and dress slowly. If the gymnastics or massage are not ordered, may rise earlier. May see visitors, attend to household affairs, or walk out.

"1.30 P. M.: Luncheon. (Malt, tonic, etc., as ordered.) In invalids this should be the chief meal of the day. Rest, lying down, not in bed, for an hour after.

"3 P. M.: Drive (use street cars or walk) one to two and one-half hours. (Milk or soup on return.)

"7 P. M.: Supper. (Malt, tonic, etc., as ordered; detail of diet.)

"10 P. M.: Hot milk or other food at bedtime."

In extreme cases the patient is made to rest absolutely. No exertion of any kind is to be allowed. The bed-pan is to be used with the patient in the recumbent position. She should be removed to a couch for an hour, both morning and evening, while the bed is being freshened. The patient should be fed, and later, when allowed to feed herself, the meat should be cut up for her. A sponge-bath should be given daily, but if it causes depression it may be given less frequently. After two weeks, if the physician thinks it desirable, the patient may be read to for one to three hours. The monotony of the treatment is not so trying as would be imagined, for the routine of the day occupies most of the time. The nurse and masseuse should not talk about or listen to the patient's ills, and the latter should be taught that she must speak of them only to the physician.

Massage and electricity are resorted to in order to

maintain nutrition and circulation while at rest. Mitchell gives minute instructions regarding both. General massage of the whole body is to be given, care being taken not to excite pain by manipulating tender areas. The tapping movements, slapping, and the like are not to be used in nervous patients. Care should be exercised to avoid producing sexual excitement; this may be aroused in both sane and insane patients from friction near the genitals or over the back or buttocks. If it does occur, the operator should avoid the sensitive areas. In the average case massage should be given for an hour daily for about six weeks, and then on each alternate day. The time chosen for this should be about midway between meals. Care should be taken to keep the parts warmed by the massage well covered.

The same precautions should be taken in using electricity as when giving massage. The induced current should be used, and it is well to employ a battery in which the breaks are very slow—from two to five seconds. The more rapid interruptions are useful, however, but in the hands of an unskilled operator may excite pain and apprehension in the patient. The poles may be placed 4 or 5 in. apart on the muscle, and the whole body should be gone over.

In thin, anemic, exhausted women, who are the ones usually treated, the diet is as follows: The patient is put to bed and the diet generally changed from the ordinary to a milk diet. This is done by giving from 3 to 4 oz. of milk every two hours, after the Karell method. Then the patient is given 2 quarts of milk in each twenty-four hours. The amount is divided and a portion given at three-hour intervals. At the end of the first week a pound of beef is administered in the form of a raw soup.

This is given three times a day, a pound of beef being used each day. If desired, this may be replaced by peptonized food. (See formulas in the Appendix.)

After ten days three meals a day are given. These are led up to gradually, and the patient is kept on the milk diet until the stomach feels comfortable. Then, usually within from four days to a week, a light breakfast is allowed, and in a few days more a chop is given at the midday meal. After a short time the patient is given three full meals, together with 3 or 4 pints of milk instead of water, either with or after the meals.

After about ten days of this treatment, from 2 to 4 oz. of good fluid extract of malt are given before each meal. "As to meals, I leave them to the patient's caprice, unless this is too unreasonable; but I like to give butter largely, and have little trouble in having this most wholesome of fats taken in large amounts. A cup of cocoa or of coffee and milk on waking in the morning is a good prescription for the fatigue of the toilet."

In some of the difficult cases ½ oz. of cod-liver oil is given half an hour after each meal. If it causes nausea or interferes with the appetite, it is given as a rectal injection. This is of particular service where the bowels are sluggish. It may also be given in the form of an emulsion with pancreas extract. In some it acts admirably; in others it may cause tenesmus.

SCHEDULE FOR A COMPLETE REST CURE.

Until otherwise ordered, absolute rest in bed. No visitors, no reading, and no conversation with nurse on the subject of disease or treatment.

First Day.—One quart of milk in divided doses every

two hours. 8 A. M.: Cold bath followed by a brisk rub. If patient does not react well, a warm bath may be used for several days and then the cold bath tried again. 11 A. M.: Twenty minutes' massage. 2.30 P. M.: Room darkened for a nap. 4 P. M.: Twenty minutes' electricity. 9 P. M.: Brisk rub over the entire body.

Second Day.—Same as first. Milk 1½ quarts; massage and electricity increased to forty minutes.

Third Day.—Two quarts of milk in divided doses at three-hour intervals; massage and electricity one hour each.

Fourth Day.—Same, with addition of white of a raw egg with each glassful of milk; cupful of cocoa on awakening.

Fifth Day.—Same, with addition of raw-beef soup or broth, 1 pint in two portions; a slice of toast.

Ninth Day.—Same, with soft-boiled eggs and toast for breakfast.

Tenth Day.—Cocoa on awakening. 7.30 A. M.: Bath and brisk rub. 8.30 A. M.: Breakfast, including cereal, chop or eggs, bread and butter, and 2 glassfuls of milk with the whites of 2 eggs. 10 to 11 A. M.: Massage. 11.30 A. M.: Half-pint of milk, whites of 1 or 2 eggs. 2 P. M.: Full dinner, including 2 glassfuls of milk and whites of 2 eggs. 3.30 to 4 P. M.: Electricity. 5 P. M.: Glassful of milk with whites of 2 eggs. 7.30 P. M.: Supper including milk and eggs. 9.30 P. M.: Brisk rub and a glassful of milk.

Schedule as above until desired effect is obtained. This to be modified to suit the individual case. On twelfth day 2 oz. of malt extract with a teaspoonful of solution of peptonate of iron and manganese, or a tablespoonful of Gude's Peptomangan is usually ordered.

Bowels to be kept open. Use butter in as large quantities as possible.

The patient is allowed to undertake movements for herself very gradually, being allowed to move about in bed by herself and then sit up, and later on to sit outdoors and then to walk a few steps, to take a drive, etc. If this is not done gradually the moving about may be attended by dizziness, vertigo, or unpleasant exhaustion, which may be avoided entirely by gradually increasing the patient's efforts for herself.

DIET FOR THE INSANE.

Feeding constitutes a very important part of the treatment of the insane. All insane persons who are below the standard of nutrition should be built up and an earnest effort made to increase the weight of the patient. One of the English alienists was wont to talk of the "gospel of fatness." This is best accomplished by a system of feeding somewhat similar to that outlined in the rest treatment, the rest being prescribed or omitted as the case demands. It should always be remembered that an insane person may contract other diseases besides his mental disorder; this is true especially of stomach and intestinal disorders, which may give rise to delusions regarding the taking of food.

When the patient refuses food, the question as to the advisability of feeding him by force arises. Everything considered, it is well to begin the forced feeding early, before the patient has time to suffer from his fasting. It should be accomplished by means of the stomach tube or the nasal tube, and about a liter (1 quart) of food should be introduced. The food may be given thus twice daily, and in the case of weak patients three or four

times a day. Milk, milk and eggs, and broths may be used for this purpose. A sufficient number of attendants should be at hand to control the patient if he becomes unruly and resists feeding. After a patient has been fed with the tube several times he will often prefer to take his nourishment in the usual manner.

Whether the esophageal or the nasal tube is to be used will depend on the preference of the physician. Each has its advantages. The nasal tube is generally preferred, since it is easier to introduce, can not be bitten by the patient, and does not cause the patient to struggle as much as the stomach tube; it may, however, be passed into the larynx, and in this way liquid might be introduced into the trachea. This danger is more fancied than real, and can be avoided if the patient is allowed to breathe before the fluid is poured into the tube. While he is breathing the tube should be pinched, and if it is in the larynx this fact will be noticed at once. Ordinarily, but not always, coughing ensues; it does not follow when the pharynx is anesthetic, as it occasionally is in the insane or hysteric. The stomach tube does not allow the food to be regurgitated so easily as the nasal tube, but for this method of feeding a mouth-gag is required, which may injure the mouth or teeth, or it may slip, permitting the patient to bite the tube. If the patient has acquired the knack of regurgitating the food, this may be prevented by tickling the ribs while the fluid is being introduced. This prevents the fixing of the diaphragm, and is successful in most cases.

Tact and experience in handling the insane are of the greatest value. Some nurses or attendants have little difficulty in getting patients to eat, whereas others seem never to learn how to manage them. It must be remem-

bered than an insane patient may not eat for reasons that are often easily overcome. He may prefer to take his food alone, because he does not think himself worthy of eating at the same table with other people. He may fear that his food has been poisoned, and he should be convinced of the fallacy of this by the nurse, who should eat a portion before him or allow him to see the food prepared, or he may be given food that can not easily be poisoned, such as eggs, whole vegetables, and fruit. When the patient's confidence is gained the battle is generally won. In some cases the delusion persists for a long time and can not be dispelled.

Food should always be served daintily. An insane person who may be very much unbalanced may still notice the slightest variations in the way of serving food. Attendants are apt to be negligent in this respect. For all patients who have a suicidal tendency the food should be served on dishes that can not be broken. No knives should be allowed, and the food should be served so as to require no cutting. An attendant should watch those who are apt to bolt their food and see that it is cut into small pieces before serving it. Cases of sudden death have followed the drawing of a piece of meat into the larynx while eating too rapidly.

CHAPTER XVIII.

DISEASES IN WHICH DIET IS A PRIMARY FACTOR.

DIABETES MELLITUS.

THIS is one of the diseases in which the diet is of primary importance and, in fact, the principal part of the treatment. No one but a skilled physician should ever attempt to regulate the feeding of a diabetic patient, as the well-being, and usually even life itself, are directly dependent upon the diet. The outlook in the disease is in many cases gloomy enough with the greatest possible care, whereas in poorly managed cases it is made much more so. Many complications, causing great suffering on the part of the patient, are the direct result of errors in diet.

In order to carry out intelligently the physician's orders, the nurse should understand the principles of the diet to be followed. Diabetes is a disease in which the capacity to burn up sugar as food is depressed. The sugar taken is to a great extent passed off from the body in the urine. Not every person who has sugar in the urine is a diabetic.

The chief indications in the management of diabetes are to maintain the patient's strength, to increase the sugar-destroying power of the body, and to avoid com-

plications. These results are best accomplished by supplying a sufficient amount of food in such a form that it may be utilized by the patient, and by avoiding carbohydrates.

The sugar which is passed in the urine has not been used as food, and this amount must be taken up in the other food elements or the patient will lose weight. If too much carbohydrate food is taken continuously, the patients nearly always do badly and develop complications.

The physician in prescribing the diet has in mind three things: the amount of sugar that the patient is excreting daily, the gain or loss of weight, and the general condition of the patient. There are other factors which may influence his choice of diet, but these are very technical matters.

From time to time the physician may desire to see how much sugar the patient passes when taking a diet free from carbohydrates. For this purpose the patient is ordered a diet somewhat like the following:

Von Noorden's Carbohydrate-free Diet.—*Breakfast:* 5 gm. of tea steeped in 200 c.c. of water; 150 gm. of ham; 1 egg.

Luncheon: 200 gm. cold roast beef; 60 gm. fresh cucumbers with 5 gm. vinegar; 10 gm. olive oil, and salt and pepper to taste; 20 c.c. brandy with 400 c.c. Apollinaris water; 60 c.c. coffee without milk or sugar.

Dinner: 200 c.c. clear bouillon; 250 gm. beef (weighed raw) basted with 10 gm. butter; 80 gm. green salad with 10 gm. vinegar and 20 gm. olive oil, or 3 tablespoonfuls of some well-cooked green vegetable; 3 sardines in oil; 20 c.c. cognac with 400 c.c. Apollinaris water.

Supper: 2 eggs (raw or cooked); 400 c.c. seltzer water.

The patient is not put upon this diet suddenly, but the carbohydrates are reduced gradually. This diet is generally used for five days, during which time the condition of the patient's urine is investigated by the physician.

Prophylactic Diet.—Diabetes sometimes occurs in certain families, and members of such families are frequently ordered to limit the amount of carbohydrate food, especially about the age at which they have a tendency to take on flesh.

Dietetic Treatment.—Mild cases in old people are generally given a diet restricted in a more or less general way. Foods consisting entirely or nearly so of sugar are forbidden, as well as dishes made largely from flour. Bread and potatoes are allowed according to the desire of the patient, and also any vegetables that may be served. When this form of diet is not sufficient the physician may order more restrictions. If the patient is thin the nurse must see to it that he takes the amount of food prescribed. In young persons even mild cases require close attention, and sugar may be withdrawn altogether and the food sweetened with certain drugs, as saccharin, saxin, garantose, dulcin, and the like. These are usually ordered in the form of tablets, each one representing the sweetening power of an ordinary piece of cut lump sugar. The patient is limited as to the amount of starchy food that is permitted, and is urged to take milk, cream, and fatty foods.

Severe cases require most careful attention. The diet is very strict, and for certain periods each year the patient

is put upon a carbohydrate-free diet. It is difficult to get the patient to take sufficient nourishment, and the nurse must prepare as palatable dishes as possible from the list of permitted foods. (A number of recipes will be found in the Appendix.) The patient has a great craving for sweets and bread, coupled with an enormous appetite and great thirst, and considerable vigilance is often required to see that he does not partake of forbidden food.

Certain diabetic "cures" are sometimes prescribed as a diet composed largely of oatmeal or of potatoes or of rice. In certain cases a diet largely restricted to one or other of these foods may raise the patient's capability to burn up other forms of carbohydrate.

Acidosis.—Another very important factor in the diet of diabetic patients is the question of acidosis or acid poisoning, in which some of the food, in place of being eventually reduced to carbon dioxide and water, forms instead complex acids. These acids are passed in the urine, and when they are present in large amounts may also be detected by the odor of the patient's breath, which somewhat suggests chloroform. If present in very large amounts, these acids cause diabetic coma and other symptoms.

A certain amount of carbohydrate food, often even in the form of sugar, may be prescribed to aid in the excretion of certain acids formed in the body, and sometimes also with the view of preventing their formation. This is a point requiring the greatest care, and should never be undertaken except by the physician. Alkalis, especially vichy water and bicarbonate of soda, are often given for the same purpose.

Diabetic Coma.—The patient may become drowsy, complain of feeling numb, and then pass into a condition of unconsciousness. This is a very dangerous condition, and usually the patient dies. Certain changes in the urine may warn the physician that there is danger of coma, and when these changes are noted a more liberal diet is allowed. This extra diet increases the amount of urine passed and may flush out with it the poisonous materials from the blood. When coma occurs alcohol is given, and salt solution and sometimes solutions of grape sugar are given subcutaneously to increase the flow of urine. Alkalis, such as sodium bicarbonate, are frequently given either by mouth, by rectum, subcutaneously, or intravenously.

Diabetes is frequently complicated with other diseases, as obesity, gout, or disease of the kidneys, which render the problem of the diet extremely difficult.

Substitutes for Bread.—"**Torrified Bread.**"—Thin slices of bread are toasted until very dark brown or almost black. It is supposed that the starch and gluten are partially decomposed by the heat. This will almost certainly not be eaten to excess by the patient, and Williamson states that this is probably its only advantage.

Gluten bread, introduced over fifty years ago by Bouchardat, has always been popular in France. This bread is made from gluten flour from which the starch has been washed out. The gluten flours on the market differ very much in the amount of starch which they contain.

Directions for making gluten bread accompany the packages of flour.

Bran bread, made from bran flour, is also to be recommended. The bran must be ground quite fine or it will not be digested.

Soy beans or **soy bean flour** may be used to great advantage in diabetics, and numerous recipes will be found at the end of the book. The small amount of sugar in the beans should be remembered, but there are few foods as valuable which contain as little.

Almond cakes and **cocoanut cakes** are of considerable value as bread substitutes.

Aleuronat is a vegetable albumin flour made by Dr. Hundhausen from wheat. It is a light-yellowish powder, and contains from 80 to 90 per cent. of albumin and only 7 per cent. of carbohydrate. It was recommended in diabetes by Ebstein, who suggests that it be mixed with wheat flour. His formula contains considerable starch—*i. e.*, about one-half the amount of ordinary bread—and most patients prefer to have half the quantity of wheat bread to a double allowance of aleuronat bread.

The nurse may find it both interesting and instructive to study the tables given below, and the diet for such cases as the physician leaves with general orders may be arranged from them. Under no other circumstances should a nurse or other unqualified person attempt to manage the diet of a diabetic, and the physician should always keep in close touch with the case. The nurse will be in a position to sympathize with the patient and to take extra pains with the details of carrying out whatever may be ordered if she will try living on a carbohydrate free diet for a few days. She will learn many things in that way which may not otherwise occur to her.

The following four tables are taken from von Noorden's article in *The Twentieth Century Practice of Medicine:*

TABLE I.

First Group.—Unconditionally Allowable Foods.

Fresh meat: All the muscular parts of the ox, calf, sheep, pig, horse, deer, wild and domestic birds—roasted or boiled, warm or cold, in their own gravy or with mayonnaise sauce.

Internal parts of animals: Tongue, heart, brain, sweetbreads, kidneys, marrow-bones—served with non-farinaceous sauces.

Preserved meats: Dried or smoked meat, smoked or salted tongue, ham, smoked breast of goose, American canned meats, Australian corned beef.

Fresh fish: All kinds of fresh fish, boiled or broiled, prepared without bread crumbs or cracker meal, and served with any kind of non-farinaceous sauce, preferably melted butter.

Preserved fish: Dried fish, salted or smoked fish, such as codfish, haddock, herring, mackerel, flounder, salmon, sardellen, sprats, eels, lampreys, etc.; tinned fish, such as sardines in oil, anchovies, etc.

Fish derivatives: Caviare, cod-liver oil.

Shell-fish: Oysters, mussels, and other bivalves, lobster, crawfish, crabs, shrimps, turtle.

Meat extracts: Meat peptones of all kinds.

Eggs: Raw or cooked in any way, but without any admixture of flour.

Fats of all kinds, animal or vegetable.

Fresh vegetables: Green lettuce, endive, cress, spinach, cucumbers, onion, leek, asparagus, cauliflower, red and white cabbage, sorrel, French beans. The vegetables, so far as they are suited to this mode of preparation, are best cooked with meat broth or a solution of Liebig's extract and salt, and covered plentifully with butter, lard, suet, or goose fat. The addition of flour is not permissible.

Preserved vegetables: Tinned asparagus, French beans, pickled cucumbers in brine or vinegar, mixed pickles, sauer kraut, olives.

Spices: Salt, white or black pepper, Cayenne pepper, curry, cinnamon, cloves, nutmeg, English mustard, anise seed, caraway seed, parsley, dill, borage, pimpernel, laurel, capers, chives, garlic, etc. Many of these spices contain, indeed, a rather large percentage of carbohydrates, but they are added to the food in such small quantities that this may be disregarded.

Soups: Clear soups and broths, with or without eggs, marrow, fresh or dried vegetables (Julienne), clear turtle soup, etc.

Cheese. Stracchino, Neufchâtel, old Camembert, Gorgonzola, and all other fatty or so-called cream cheeses.

Beverages: All kinds of natural or artificial carbonated waters, either clear or with lemon juice and saccharin or glycerin, or with rum, cognac, whisky, arrack, cherry brandy, plum brandy, Nordhäuser, rye whisky, etc. Light Moselle or Rhine wines, claret, or Burgundy in amounts prescribed by the physician. Coffee, black or with cream, without sugar, but sweetened with saccharin if desired. Tea, clear or with cream or rum.

TABLE II.

Second Group.—Foods Permissible in Moderate Quantities.

These contain carbohydrates, but in so little amounts that they need not be considered, and demand no compensation by a reduction in the allowance of bread. Some of the articles contain a rather large percentage of carbohydrates, but the absolute quantity in which they are consumed is small.

The amounts here given have been fixed by practical experience, and it will seldom be found necessary to increase them. Of the dishes here given, when they are allowed at all, only a few—from two to four—are to be selected each day. It is possible in this way to secure a great variety in the patient's dietary.

Internal parts of animals: Calves' liver, giblets—up to 100 gm.

Sausage: Liver sausage, preferably the fatty kinds, liver sausage with truffles, black pudding—90 gm. Meat sausage—80 gm. German sausage, Frankfurter sausage, and the like, brawn, head-cheese, sausage-meatballs—100 gm.

Patties: Pâté-de-foie gras, potted beef, ham, tongue, salmon, lobster, anchovies, etc.—½ to 1 tablespoonful.

English sauces, such as Worcestershire, Harvey, beefsteak, anchovy, lobster, shrimp, India soy, China soy—1 teaspoonful.

Cream, from 4 to 6 tablespoonfuls a day.

Cocoa, prepared without sugar—25 gm.

Cheese: Emmenthal, Romadur—60 gm.; Gervis, Stilton, Brie, Holland, Gruyère—50 gm.; Edam, Cheddar, Gloucester, Roquefort, Parmesan—30 gm.; Cheshire, 25 gm.

Vegetables (prepared without flour or sugar): 5 Teltower turnips; salsify, turnip-rooted celery, turnip, cabbage, pumpkin—2 tablespoonfuls; green peas, beans, carrots, Brussels sprouts—1 tablespoonful; 1½ artichokes; 1 truffle; 5 medium-sized mushrooms; 1 tablespoonful of morels or other edible mushrooms.

Raw vegetables: 8 radishes; 2 sticks of celery; 2 medium-sized tomatoes.

Nuts: 2 walnuts; 6 hazelnuts; 3 almonds; a thin slice of cocoanut; 8 Brazil nuts.

Fresh fruits: 1 thin slice of melon; 1 small tart apple; 1 or 1½ peaches; 1 spoonful of raspberries or strawberries; 4 spoonfuls of currants; 6 green gages; 12 cherries; ½ of a medium-sized pear; corresponding amounts of other fresh fruits.

TABLE III.

Third Group.—Conditionally Allowable Foods.

The conditions under which dishes from the following table are permitted is that an equivalent shall be deducted from the allowance of bread. The amounts given below are the equivalents of 50 gm. of white bread, containing about 30 gm. of starch. Advantage is taken of the fact that larger amounts of certain carbohydrates (cane sugar, milk sugar, fruit sugar, etc.) may be allowed than of starch. Some of the dishes given in the preceding table appear again here because, if they are eaten in large quantities, an account must be taken of the carbohydrates which they contain:

1 liter of milk (sweet, sour, or buttermilk).
1½ liters of kumiss, prepared in the Russian way.
1 to 1½ liters of kefir, fermented for at least two days and prepared without the addition of sugar.
1 liter of cream.
60 gm. of rye bread, Graham bread, or Hamburg pumpernickel.
65 gm. of Westphalian pumpernickel.
100 gm. of aleuronat bread, prepared after Ebstein's formula (containing 27.5 per cent. of carbohydrates and 32 per cent. of vegetable albumin; the aleuronat breads are very variably compounded).
35 gm. of zwieback and simple coffee cakes, made without sugar.
30 gm. of English cakes of various sorts.
30 gm. of "Eichel-cacao" (Stollwerck's).
50 gm. of chocolate (Stollwerck's).
40 gm. of chocolate (French make).
40 gm. of chestnuts shelled or 60 gm. unshelled.
35 gm. of cane sugar, brown sugar, or rock-candy.
35 gm. of sweet preserves.
40 gm. of fruit sugar.
40 gm. of milk sugar.

50 gm. of fruit jam.
40 gm. of honey.
40 gm. of flour—wheat, rye, barley, buckwheat, millet, or oatmeal or cornmeal.
45 gm. of bean, pea, or lentil flour.
35 gm. of starch preparations, potato, wheat, or rice, starch, tapioca, sago, maizene, mondamin, etc.
35 gm. of rice.
35 gm. of farinaceous preparations — noodle, macaroni, oatmeal, grits, barley.
50 gm. of lentils, peas, beans (weighed dry).
100 gm. of green peas.
180 gm. of new potatoes.
140 gm. of winter potatoes.
120 gm. of apples, pears, green gages, plums, damsons, mirabelles, apricots, cherries, grapes.
200 gm. of strawberries, raspberries, gooseberries, mulberries, currants, blackberries, whortleberries, blueberries.
3 peaches.
40 gm. of figs.
3 bananas.
A handful of walnuts, hazelnuts, almonds, or Brazil nuts.
$\frac{3}{8}$ liter of beer of any sort.
$\frac{1}{8}$ liter of sweet wine.

TABLE IV.

Fourth Group.—Especially Valuable Foods.

The great value of the articles contained in the list on the following page, of which, however, there is but a small choice, is due in part to the high percentage of protein and in part to that of fat. The proportion of albumin and fat is given for each 100 gm. of the food substance. Some contain carbohydrates also, the percentage of which is given for the sake of completeness, but its nutritive value is not counted.

100 Gm.	Protein.	Fat.	Carbo-hydrate.	Calorie value.
Vegetable oil		100	. .	930
Butter	1	85	0.5	830
Bacon (salt or smoked)	10	76	. .	748
Devonshire cream	2	57	2	538
Cream cheese (Gervais, Neufchâtel, Stilton, Stracchino, etc.)	19	41	1	451
German sausage (Cervelatwurst)	18	40	. .	446
Ham	25	36	. .	437
Cheddar cheese	28	33	2	422
Fat Pork	14	37	. .	400
Smoked ox-tongue	24	32	. .	396
Fatty cheese (average)	25	30	1.5	381
Yolk of egg	16	31	0.5	354
Fat goose	16	30	. .	345
Fat beef and mutton	17	29	. .	337
Brie cheese	19	26	1	320
Fresh-water eel	13	28	. .	312
Smoked mackerel	19	22	. .	382
Caviare	31	16	. .	276
Cream	4	23	4	230
Fat salmon (fresh or smoked)	22	13	. .	210
Hens' eggs (weighed with the shells)	12	10	0.5	142

GOUT AND GOUTINESS.

Sydenham said: "Great eaters are liable to gout, and of these the costive more especially. Eating as they are used to eat when in full exercise, their digestion is naturally impaired. Even in these cases simple gluttony and the free use of food, although common incentives, by no means as frequently pave the way for gout as reckless, inordinate drinking." This statement is as near the truth as anything that has been said since.

The causes of gout are alcoholism, overeating, heredity, indigestion, constipation, and it is also sometimes seen in leadworkers.

In gout there is a disturbance of metabolism, particularly that of the nitrogenous elements, and especially of what is known as the purin nitrogen. (See Purin Metabolism.) In gouty individuals there is retention of various

products of metabolism in the body, and it is generally advised that foods containing purin bodies should be reduced or even omitted. The diet for the gouty should be always carefully supervised by the physician.

In the acute attacks the diet should be liquid or semisolid. Milk, bread and milk, and farinaceous gruels are usually prescribed. After several days the light meat of boiled or baked fish is allowed or a little easily digestible meat. The increase in the diet is always ordered by the physician.

Chronic Gout.—The diet here is also to be made up of simple plainly cooked food, all rich and indigestible dishes being prohibited. There is often a peculiar personal idiosyncrasy in regard to certain articles of diet, and this will largely influence their use. As a rule, however, the following outline will suffice for the guidance of the patient:

Soups of the plainest sorts may be taken, especially those consisting largely of vegetables. Yeo has suggested the use of vegetable purées to which beef extract has been added to give them a flavor of meat. Milk is valuable in all cases, and where it disagrees it may be skimmed, peptonized, or diluted with a carbonated water. Bicarbonate of soda may be added when it is desired to make the milk alkaline; 1 to 5 gr. to the ounce should be used according to requirements.

Meat and fish may be taken daily, preferably not at the same meal. Fresh beef, mutton, and the like are the most suitable meats, and poultry may be allowed for the sake of variety. Eggs may be taken in moderation.

Twice-cooked meats should be avoided, as should dried, smoked, or pickled meats, as well as pork and veal. Garrod allows bacon at breakfast, but fats are, as

a rule, to be avoided. Under special conditions, when the patient's nutrition is poor, they may be given if tolerated.

Only the lighter varieties of fish should be given, boiled being preferred to fried fish. Oysters and clams may be taken, the hard portion being discarded. Salt fish, as well as mackerel, salmon, eels, and all other heavy fish, should be prohibited. Crabs, lobster, shrimp, and the like, as well as sauces, are usually to be avoided.

Vegetables, when they are easily digested, may be permitted. Peas, beans, potatoes, artichokes, salsify, onions, turnips, greens, cauliflower, and cabbage are all allowable, as are likewise celery, lettuce, and similar green vegetables. Carrots and beets, because of the sugar they contain, and asparagus, tomatoes, rhubarb, and sorrel, on account of their acid, are best avoided. All preserved and pickled vegetables, as well as the coarse and fibrous portions of all vegetables, are to be omitted from the dietary.

The use of sugars and sweets is a very important part of the dietary, for, as a rule, they are a source of much trouble. Each individual differs in regard to the amount which may be allowed. Starchy foods may be allowed according to the patient's ability to digest them, without causing fermentation and flatulence, and this also varies greatly in different individuals.

Fruit is best taken in the morning or during the interval between meals. It should, as a rule, be avoided during the latter part of the day, after full meals or with wine. Among the most suitable fruits for the gouty are oranges and grapes. Baked apples or stewed fruit may be taken. The sweet juice of the latter is, however, best

avoided. Garrod advises the avoidance of all stone fruits, but allows baked apples and pears and strawberries sparingly. Fothergill suggested that bicarbonate of soda be taken with stewed fruit to correct the acidity. Opinions differ regarding the use of fruit by the gouty. If any particular fruit disagrees with a patient it should, of course, be avoided. Patients often manifest idiosyncrasies respecting fruits, and these furnish a guide to their suitability.

When gout is complicated with obesity, diseases of the kidneys, diseases of the stomach or any other disease, special diets are ordered.

Arthritis Deformans.—In this disease there are deformities of the bones which are sometimes confounded with gout. The diet probably has no influence whatever over this disease. Instead of restricting the diet, it should be as nourishing as possible.

Scurvy or Scorbutus.—This disease occurs in adults where there is a deficiency of fresh food. It is the scourge of armies, and formerly was frequent among sailors. To prevent it fresh food should be given. Canned food, while not an ideal preventive, is useful. Lemon or lime juice, vinegar, and onions are especially valuable as preventatives. The treatment of the disease, when it occurs, is chiefly dietetic, and consists in giving a good, nutritious diet with fresh fruits and vegetables, fresh meats and the like. The above-mentioned preventatives may be used where the other fresh foods are not available.

Infantile Scurvy (*Barlow's Disease*).—Scurvy is frequently seen in infants, especially between the sixth and the fifteenth month. In almost every case improper feeding is the cause. It has even occurred where the child was breast-fed, but more often from the following

feeding, in the order of their frequency: the proprietary infant foods, sterilized milk, condensed milk, and Pasteurized milk. The treatment is very satisfactory, and consists in placing the child upon a proper diet and giving in addition fresh orange juice, from ½ to 3 or 4 oz. daily. The juice of any fresh ripe fruit, as of peaches or grapes, may be used instead.

OBESITY.

There is probably no condition that has been more widely discussed by laymen of both ancient and modern times than obesity, for no disease is more thoroughly associated in the lay mind with its proper causes and its relations to diet than this "oily dropsy", as Bryon calls it.

The accumulation of fat is associated with increasing years, but it is by no means confined either to old or middle age, as is exemplified in the fat children familiar to all; obesity may be a plague even of infants.

The causes of obesity are so well known as to require only passing mention. About 50 per cent. of cases owe their primary origin to hereditary causes. Women are more frequently affected than men. With the advance of years, in some there is a tendency to accumulate fat. Overeating and overdrinking have been named as causative factors, especially when combined with a quiet, sedentary life.

The fats and the carbohydrates are the principal elements in the diet that are apt to be converted into fat; but proteins also, if the supply exceeds the demand and assimilation is active, will be converted into body-fat and stored up in the subcutaneous tissues. The liver and the heart are also converted into storehouses for fat, and

later there may be a fatty degeneration of both organs, as well as of the coats of the arteries.

The dangers accompanying the excessive accumulation of fat are manifold, and include a large number of diseases that may be influenced by it either directly or indirectly. These will be discussed when the indications for reducing the weight of patients are considered. Weak heart, anemia, gout, and diabetes are among the most frequent diseases with obesity.

Reduction cures of many kinds are vaunted by their respective originators. Ébstein has summed up the whole matter in the following sentence: "Corpulence can only be permanently cured by a permanent change of life and diet regulated by physiologic principles."

Reduction of weight is in many cases contra-indicated, and a reduction cure should never be undertaken without the advice of a physician. In women especially reduction may be a cause of hernia, of dislocation of the kidney, or of the uterus, and may also bring on gall-stone colic in those who have gall-stone disease. In old people reduction cures are not, as a rule, advised. In many slight cases all that is needed is a regulation of the diet and life so as to prevent any further increase. Reduction may be of especial benefit in stout individuals with heart disease, and a method known as "Oertel's method," which combines diet and exercise, is usually followed. Reduction is also useful in some cases of respiratory disease in very stout persons. Bronchitis and asthma may be mentioned in this connection. Where the patient has any disease interfering with locomotion, the diet should be so arranged that there will be no excessive accumulation of fat, as the added weight may be the cause of making the patient helpless.

A much discussed point is whether it is possible to reduce any special part of the body more rapidly than the remaining parts. This is a method often sought by women who have borne several children and who have large deposits of fat in the abdominal walls, causing an unsightly prominence of the abdomen. If the fat is reduced slowly, every part of the body, including usually the abdomen as well, will be reduced simultaneously. If it is reduced rapidly, it seems to be removed principally from certain parts of the body, as the neck, breasts, arms, and calves of the legs. Certain advocates of massage claim that the massage of the parts will cause a more rapid reduction. Von Noorden had one arm of an obese patient massaged for six weeks. At the end of that time the arm that had been massaged had increased 1½ cm. in circumference, whereas the arm that had not been massaged remained the same.

Massage of the abdomen during a reduction cure may exert a beneficial effect by relieving the constipation, which is apt to be troublesome. Exercise is still more potent, particularly for reducing the abdomen. This is accomplished by standing erect and then bending forward in an effort to touch the toes with the tips of the fingers. Too much should not be expected from this, even when persisted in faithfully.

Prophylaxis of Obesity.—Where a tendency to obesity exists the fat-forming foods should be partaken of but sparingly, and sufficient outdoor exercise taken to keep the weight within reasonable limits. The fat-forming foods are fatty foods of all kinds, the sugars and starches.

Dietetic Treatment of Obesity.—There are numerous methods of diet. The method to be used in any

given case is to be determined by the physician. These reduction cures are frequently referred to as Banting cures. The Banting method was that used in the case of a Mr. Banting, by his physician, Dr. Harvey. It was in great vogue some years ago, and the name became erroneously applied to many other methods. It is too severe for the average patient.

Banting Diet for Obesity (Yeo).—"*Breakfast*, 9 A. M.: 5 to 6 oz. of animal food-meat or boiled fish (except pork or veal); a little biscuit or 1 oz. of dry toast—6 to 7 oz. of solids in all. A large cupful of tea or coffee (without milk or sugar)—9 oz. of liquid.

"*Dinner*, 2 P. M.: Fish or meat (avoiding salmon, eels, herring, pork, and veal), 5 to 6 oz.; any kind of poultry or game. Any vegetables except potato, parsnips, beet root, turnips, or carrots. Dry toast, 1 oz. Cooked fruit, unsweetened. Good claret, sherry, or Madeira, 10 oz. Total of solids, 10 to 12 oz.

"*Tea*, 6 P. M.: Cooked fruit, 2 to 3 oz.; a rusk or two—2 to 4 oz. of solids; 9 oz. of tea (without milk or sugar).

"*Supper*, 9 P. M.: Meat or fish, as at dinner, 3 to 4 oz. Claret or sherry and water, 7 oz.

"This allowed only from 21 to 27 oz. of solids per diem, of which 13 to 16 oz. consisted of animal food and only 2 oz. of bread; the rest consisted of fruit and fresh vegetables. There was the strictest possible exclusion of starches and sugar.

"The total fluid was limited to 35 oz."

Oertel's method is a combination of diet and exercise, and is especially applicable to patients with disturbances of the circulation. The quality and quantity of food and the amount of fluid are carefully regulated by the medical attendant according to the patient's condition.

Ebstein's method consists in giving a diet in which the carbohydrates are reduced, but in which considerable amounts of fats are allowed. The custom of giving fatty food in such cases is as old as Hippocrates, for he says, "The food shall be fat in order to satiate quickly." This method is, however, based on an erroneous opinion.

In general it may be stated that the diet should be limited in amount, the starches and sugars reduced to a minimum, fats reduced or omitted altogether, and the amount of fluid cut down to a very small amount. The food given consists of meat, eggs, fish, fruits, and green vegetables. Sufficient exercise is taken to keep the weight down to the required number of pounds.

When obesity is complicated with any other disease, the diet may be a point of considerable difficulty.

DIET FOR LEANNESS.

In a general way the indications for fattening thin people is the reverse for the diet used in obesity. Many individuals are thin as a matter of constitution, and such as these can not be fattened by any means. There may be some special cause for the leanness, and when the physician can discover this and remove or relieve it, the patient may be increased in weight. Patients emaciated from acute illness are readily fattened.

The patient should lead a quiet outdoor existence, free from care or excitement, and should get sufficient sleep. The meals should be ample, and as much carbohydrate and fatty food taken as possible. Cream, milk and cream, butter, cocoa, chocolate, bread, cereals (well cooked), farinaceous puddings, potatoes, legumes, and sweet fruits should all be partaken of in abundance. All sweets—honey, syrups, cakes, and the like—may be taken if they

agree with the digestion. Beer, especially the darker varieties, porter and brown stout are useful. Sweet wines are sometimes ordered, and malt extracts where it is not desirable to use alcoholic beverages. Strong alcoholic drinks, acids, spices, and many green vegetables are forbidden.

DIET IN SKIN DISEASES.

Certain skin affections are caused directly or indirectly by dietary errors; others are prolonged or intensified by an improper diet, and still others are connected in some way with diseases of the alimentary tract or with disturbed metabolism.

Eczema.—All food which is known to cause erythema or urticaria in the individual should be avoided, as should all food which is liable to undergo fermentation in the intestinal tract or which will produce indigestion. Irritating spices and alcoholic beverages are usually omitted from the dietary. The meals should not be too large, should be taken at regular intervals, and a simple varied dietary should be followed. Gouty and obese patients are usually ordered diets suitable for their disease. A milk diet is frequently used in persistent cases.

In infants it is important to have the digestion in perfect order.

Urticaria (*Hives*).—Many articles of diet cause hives in certain individuals. Among the most frequent causes are strawberries, oysters, crabs and other shellfish. Partially spoiled or stale articles may also be a cause.

Acne.—All indigestible articles of food are to be avoided, and the diet should consist of easily digested fresh food. Excessive quantities of fat should be avoided.

CHAPTER XIX.

SPECIAL DIET CURES.

The Milk Cure.—Milk is used extensively as a food during illness, and it has also been warmly advocated as a curative agent, especially by Karell, of St. Petersburg, and Weir Mitchell.

Physicians may prescribe an exclusive milk diet in a large number of diseases, chief among which are diseases of the kidneys, liver, heart, and intestines. It is also at the outset of the rest cure.

Method of Administration.—Well-skimmed milk from the country, as fresh as can be procured, is used. Later on the unskimmed milk is often ordered. Karell begins with from 3 to 6 oz. three or four times a day, and increases the amount gradually. The milk is to be taken slowly, at regular intervals, allowing it to mix with the saliva. In winter it is warmed, and in summer given at the room temperature. After a week, if the stools remain solid, the quantity is increased, 2 liters (quarts) a day being given during the second week in favorable cases. The regular hours are to be insisted upon. If the milk causes diarrhea it is boiled. Constipation is regarded as a sign that the milk is agreeing, and the bowels may be moved if necessary by laxatives or enemata. Small quantities of coffee mixed with the morning's milk, or stewed prunes or baked apples in the afternoon, are useful in relieving constipation.

If there is a flatulence, it usually means that too much

milk is being given or that it is not properly skimmed. If there is thirst, plain water or a carbonated water may be given. Lime water or one of the infant foods may be mixed with the milk to render it more digestible.

During the second or third week, if there is an irresistible desire for food, a little salt herring or a bit of stale bread with salt may be given. Once a day milk soup thickened with a cereal may be given. After five or six weeks the ordinary diet is gradually resumed, but large quantities of milk are still taken.

During the first week the milk causes slight drowsiness, a coated tongue, and a peculiar taste in the mouth. The stools are light yellow and resemble the milk stools of infancy. The urine is increased in quantity. There is a slight initial loss of weight, but an increase later on in the cure.

Salt-free Diet.—The average daily diet contains about 1 gram of sodium chlorid—that is, common table salt—in the original composition of the food, and 10 to 20 grams are added daily as seasoning. It has been found that by adding salt to the diet of a patient suffering with certain forms of nephritis that the edema, if present, could be increased, or, if it was not present, it could be produced. This led to the reduction of the quantity of salt taken by edematous patients, and in some instances with rather remarkable results. Some similar results have been obtained in the edema due to heart disease, and a salt-free diet has also been advised in a great many other conditions. In cases with kidney trouble, where there is constant thirst, a salt-free diet is often of great benefit, the sipping of water at short intervals is avoided, the mouth becomes moist and more comfortable. It is a good plan to omit the salt cellar from the table or tray,

and if no effect is noted the quantity of salt put in the food during its preparation should be greatly reduced or omitted altogether.

Salt-free diet may be easily arranged with the coöperation of the cook, and may consist of the following articles of diet, from which the patient can very easily subsist. These can be modified according to the disease for which the patients are being dieted:

Bread should be made without salt. The average bread contains about 10 grams for each kilogram, sometimes more. The bread which has not had salt added to it contains about 0.7 centigrams per kilogram.

Meat should always be used fresh, and most people experience little difficulty in eating it without salt. The cook should be instructed not to use salt in its preparation. Meat contains on an average of about 1 gram per kilogram. Fresh-water fish may be used, but salt-water varieties contain large amounts of sodium chlorid. Fresh eggs may be taken in any form desired, each egg containing about 25 centigrams. Fresh butter, fresh cream, and saltless cheese may be used freely.

Potatoes may be prepared in many varieties of ways, and may be made palatable without the addition of salt. The same is true of rice. In addition to the above, green peas, carrots, leeks, endive, lettuce, French beans, celery, artichokes, and salads of various kinds may be added to the dietary. Sweetmeats, pastry made without salt, and raw or cooked fruit may also be used. Chocolate will be found of especial value. Tea, coffee, and beer, or even wine may be taken as far as the amount of chlorids which they contain are concerned.

Other Diet Cures.—Many other cures are used in various parts of the world. Almost every article of diet

has at one time or another been vaunted as a "cure." Whey, to which alkaline mineral waters have been added, is sometimes prescribed with plenty of fruit and vegetables and little meat. Kumiss is used in Russia. Grapes, apples, and other fruits are used in certain countries. A "dry" cure, where the amount of liquid is greatly reduced, is sometimes prescribed, especially for aneurism. A meat-and-hot-water cure is used for stomach disorders. The Kneipp cure consisted chiefly of a diet of fruit, bread and milk, with small quantities of meat and vegetables. The cure also directs that the patient walk barefooted in the grass while the dew is still on it.

CHAPTER XX.

DIETETIC MANAGEMENT OF SURGICAL CASES.

SURGICAL operations that must be performed immediately, of course, admit of no preparation. Most operations, however, may be postponed for several days or longer, thus enabling the patient to be put in good condition by rest, preferably in bed, and a nourishing, easily digested diet. The value of the rest in bed is greatly augmented by massage, electricity, and baths where the condition of the patient admits of their use; by tonics; and by laxatives to correct the tendency to constipation that usually exists.

Anesthesia and Diet.—When an anesthetic is to be administered a routine somewhat as follows should be carried out whenever the circumstances allow: The day preceding the operation the patient should be kept quiet; the bowels should be thoroughly emptied by means of a saline purge, and the diet should be light and easily digested. The supper should be a light one, and nothing but water should be given for six hours at least before operation if possible; but water may be given up to the time of operation. *At the time of anesthesia the stomach should be empty.* This is important, as it lessens the nausea experienced by many patients after anesthesia, and also lessens the danger of vomiting food during an operation, an accident which may cause severe coughing if the food is drawn into the larynx, or may cause pneumonia if it is

drawn into the lungs. The coughing and vomiting may interfere seriously with the operator.

If it is necessary to administer an anesthetic after a full meal and circumstances permit, an emetic may be given to empty the stomach before the operation is begun, or it may be better to wash out the stomach.

Nausea is liable to follow after anesthesia, particularly after the administration of ether; this is discussed below. If nausea does not occur, a cupful of weak tea or of diluted milk may be given two or three hours after the operation, and if that is retained, milk may be given as often as every three hours if desired. A patient suffers more from too much food than from too little. For supper, bread and milk or cocoa or a slice of toast and a cupful of weak tea may be allowed. It is well, however, to wait until the following day before giving anything more. On the following day, if there is no nausea or other untoward symptoms, a light breakfast may be given, and after that as rapid return to an ordinary diet as circumstances permit may be made.

If there is nausea, or after laparotomies, operations about the head, and other operations as outlined below, especial care must be taken with the diet of the patient.

Diet after Operation.—The diet following operations should be supervised by the surgeon himself or by an assistant especially trained for the purpose. In operations about the mouth, as for hare-lip, and on the alimentary tract, the management of the diet is as of much importance as the operation itself. In order to avoid the interference of well-intentioned but misguided friends, many surgeons refuse to operate except in a hospital unless the patient is in a condition which does not permit of his being moved.

It should be remembered that confinement to bed for weeks after an operation greatly impairs nutrition, and every effort should therefore be made to get the patient in the open air, either on his bed or in a wheel-chair. Massage and electricity are employed in suitable cases to maintain the nutrition.

In patients who are up and about no especial diet is, as a rule, necessary, except after operations about the mouth, larynx, or alimentary tract. The diet should be as simple and as nutritious as possible, usually that of the ordinary individual. Patients suffering from diabetes, gout, dyspepsia, as well as vegetarians, require especial care, and the physician will in such cases give explicit directions concerning the diet.

Children should be fed according to the usual rules for them, but it is a good plan to have the children, and especially infants, in the hospital a few days, so as to get them accustomed to the diet on which they will have to live.

Those habituated to the daily use of alcohol for years should receive a moderate average amount, lest nutrition be interfered with or delirium develop. The physician will regulate the dosage in these cases.

Diet After Operations About the Head.—For the first few days the diet should be light—usually liquid—especially if the brain has been affected, and as nutritious and as easy of digestion as it is possible to make it. The bowels should be kept open. No alcohol is allowed except in cases of habitués or on the surgeon's direction. If the patient is unconscious, it may be necessary to feed him with a nasal or stomach tube. In some cases rectal feeding is used.

After brain operations, where there are no unusual

symptoms, the diet may be made semisolid, or even an easily digested solid diet may be allowed after two or three days. Milk toast, junket, bouillon and egg, soft-boiled or poached eggs, squab, chicken, and the like are allowable. The diet should be light, but sufficient in quantity, until the patient is up and about, when it may be increased to nearly the normal diet.

In operations of a plastic nature about the face, where the taking of food or vomiting is liable to open the wound, the food should be given by the rectum until all danger of the vomiting is past and until the patient can masticate and swallow without fear of injuring the part.

Diet After Hare-lip and Cleft Palate Operations.—Following these operations especial attention to the diet is necessary. The child should be taught to take food from a spoon or large medicine-dropper before operation. If the breast milk is used, it should be drawn from the breast by means of a pump and given with a spoon or dropper. Cold sterilized milk or modified milk should be used in these cases until the patient is able to take other food. Nasal or rectal feeding may be necessary in some cases.

Diet After Esophageal or Laryngeal Operations.—The diet in these cases is of the utmost importance and depends very much on the operator and the operation done. The surgeon's directions will always be explicit in such cases.

Diet and Laparotomies.—One or two days before the operation the bowels should be cleansed thoroughly by a saline or other purge, and in the case of an abdominal or pelvic operation an enema or two is ordered in addition, not only to secure cleanliness, but to obtain rest for the bowels. The washing out of the bowel should be

performed early on the morning of the operation, at six or seven o'clock, or at least three hours before the operation. No food should be given for at least four hours previous to the operation. Many surgeons operate early in the morning, before the patient has broken his fast. Others operate later in the day, and allow the patient a glassful of milk or some such light nourishment on awakening.

As a rule, nothing should be given by the mouth for twenty-four hours. Some operators allow very small quantities of carbonated water or iced water or very hot water, or if the patient is very weak and in need of nourishment, teaspoonful doses of milk may be ordered with or without lime water or a carbonated water. Hot weak tea, or if a stimulant is needed, hot black coffee, may be administered or alcoholic stimulants may be used. In these cases as in all others the nurse acts only under the direct orders of the surgeons. Interference or injudicious feeding may prove fatal. From 5 to 10 oz. of liquid food are generally allowed on the second day, and from 10 to 15 oz. on the third day. On the fourth day, if there are no outward symptoms, a soft diet may be ordered, and after a week or ten days a gradual return to an ordinary diet may be made. This varies, of course, with the operation done and the progress of the patient.

Nausea and Vomiting.—Many operators wash out the stomach after the operation and before the patient recovers from the effects of the anesthetic. This often prevents nausea, especially if ether has been given. The vomiting and nausea may be transitory, or it may last for days or a week or more and even threaten the patient's life.

While the vomiting is active no food should be given by the mouth. If it persists and the patient is weak, rectal feeding is usually resorted to if the operation permits of it. Various drugs are used to relieve the vomiting, and sometimes a glassful of hot water is given or the stomach is washed out. As a rule, total abstinence from all food and drink by the stomach is the best way to manage these cases.

Thirst.—This may be almost intolerable. The patient may drink the water from hot-water bottles if not watched. High rectal enemata of hot water are sometimes used while the patient is still on the operating-table, and do much toward relieving the thirst of the patient. If allowable, rectal injections of normal salt solution may relieve thirst. As a rule, thirst is best allayed by using the continuous rectal injection of water as recommended by Murphy. Sips of hot water or of hot weak tea are frequently given by the mouth. Carbonated water is sometimes used, but care should always be taken to allow it to effervesce partially before giving it, lest the gas accumulate in the stomach.

Care of the Bowels.—The bowels are usually moved about the third day after an operation. Sometimes it is desirable to have them moved before; sometimes to allow them to remain quiet for several more days. The surgeon should always be consulted about this if specific orders have not been given.

Dietetic Management of Shock.—The patient will, as a rule, be less shocked if in good condition than if unprepared for the operation as outlined above. After the operation, in addition to the usual means of external heat and the like, stimulating or nutrient enemata may be given. The first enema is sometimes given while the

patient is still on the table. A stimulating enema for an adult may contain 2 oz. of brandy, 20 gr. of carbonate of ammonium, with sufficient water or beef tea at 100° F. to make 8 oz. Another stimulating enema consists of 1 oz. of brandy, the white of an egg, 3 oz. of milk, and a pinch of salt.

Diet After Operations on the Various Organs.— **After operations on the liver** the diet consists largely of protein and carbohydrate food. Fats are, as a rule, not well borne, and are limited in amount or not given at all. Water is the first thing of importance, and should be forced. It has been demonstrated that if a patient suffering with gall-bladder disease does not void at least 500 cc. of urine in twenty-four hours, mental symptoms are almost certain to develop.

After operations on the pancreas the amount of fat is limited or omitted altogether from the dietary. The use of artificially pancreatized food has been suggested.

After operations about the kidney the diet should be bland and unirritating, such as has been suggested in chronic or even in acute nephritis (inflammation of the kidney). All foods known to be irritating to the kidney should be withheld. (See Nephritis.)

Diet After Operations on the Stomach.—The stomach and the upper part of the small intestine may be rendered sterile or nearly so, and this fact is taken advantage of by many operators in surgical procedures about the stomach. Finney uses the following diet: For several days prior to the operation the stomach is washed out twice daily with sterile water, the patient is given sterile liquid food served in sterile dishes. Before taking food the mouth is thoroughly cleansed with a 1 per cent. solution of carbolic acid. The food is usually given every two hours.

For four or five days after the operation rectal feeding is employed. Normal salt solution enemata are alternated with nutrient enemata every four hours. On the fifth or sixth day egg albumin is given in teaspoonful doses, gradually increased to ½ oz. every two hours if it is well borne, and finally to 1 oz. every two hours on the sixth day, 2 oz. on the seventh day, and 4 oz. every three hours on the tenth day. On the twelfth or thirteenth day the patient is given a soft-boiled egg, and the following day soft food, and on the eighteenth day light solid food.

Operators vary a great deal regarding the feeding of their stomach cases. Some allow eight days to elapse before beginning mouth-feeding, while others begin a day or two after the operation.

Diet After Operations on the Intestines.—After operations on the upper part of the intestine the feeding is the same as after stomach operations. The food should be such that but little residue will be left in the intestine.

After ordinary appendix operations the patient may be given liquid diet the second day after the operation; on the third day a soft diet may be allowed, and solid food given on the sixth day. On the other hand, if the operation has been a serious one and a large pus cavity has been evacuated, rectal feeding may be necessary for five or six days, and the return to a solid diet may require weeks.

After operations on the rectum the patient is generally given a liquid diet for four or five days, after that a soft diet, and finally in seven days or longer solid food may be prescribed.

Feeding Through Gastric or Intestinal Fistulas.—After gastric or intestinal fistulas have been made the patient may, if necessary, be fed through these

openings as early as a few hours after the operation. At first only very small quantities of liquid food are given at frequent intervals. Kehr advises alternately, every two hours, ½ cupful of tea with cognac, milk and egg, and on the second day wine with peptone. He adds bouillon with egg on the third day, and begins a "mushy" food, such as potato soup, flour soups with egg, beef tea, and minced breast of chicken, on the eighth day. After three weeks the patient may be allowed to masticate his food, and then, by means of a rubber tube, pass it into the stomach or intestine through the fistula.

CHAPTER XXI.

HOSPITAL DIET.

THERE are wide variations in the diets used in hospitals, and also in the names applied to them. In the average American hospital the classification is as follows:

Ward Diet.—This is also known as "full" or "house diet." It is the ordinary diet of all patients for whom special diet orders have not been given.

Light diet, also known as convalescent diet, is that used for convalescent patients generally and for others for whom it is suitable. It consists of milk, broths, eggs, and such other foods as are easily digestible yet nutritious.

Special Diets.—Under this heading are included dietary formulas suitable for those diseases in which diet plays an important part in the treatment. It includes such diets as have been recommended in certain diseases and which bear the name of the inventor, as Tuffnell's diet for aneurism, Banting's diet for obesity, and such general diets as the following:

Milk Diet.—This is composed entirely of milk, 2 to 3 quarts usually being allowed daily.

Meat Diet.—This consists chiefly of nitrogenous animal foods, with a minimum of sugars and starches. It is useful in certain diseases of the stomach where there is acid fermentation. It closely resembles the diabetic diet.

Farinaceous Diet.—This is made up of milk, butter,

and carbohydrates. It is prescribed for convalescents and in chronic nephritis, etc.

Special or extra special articles of diet, as they are often termed, include all articles not on the regular diet list for the day, and for which special orders are generally given.

CHAPTER XXII.

RECIPES.

BEVERAGES.

Lime Water.—Into an earthen jar containing hot water stir a handful of fresh unslaked lime. Allow it to settle; then decant the clear fluid and bottle it. Water may again be added to the lime, and the mixture covered and allowed to stand to be decanted as needed.

Almond Milk.—Blanch one pound of sweet and two of bitter almonds that have been soaked in cold water for twenty-four hours. This is done by pouring boiling water over the almonds, when, after a few minutes, they can easily be pressed out of their hulls. Grind the almonds in a mill or pound them in a mortar; mix with a half-pint of warm milk or water, and allow the mixture to stand two hours, after which strain through a cloth, pressing the juice out well. Thirty grams of almonds yield 200 calories of heat; 250 grams of milk yield 1700 calories.—(*Wegele.*)

Brandy-and-egg Mixture.—Rub the yolks of two eggs with half an ounce of white sugar; add 4 ounces of cinnamon water and then 4 ounces of brandy. Dose: One or two teaspoonfuls every two hours, according to age.—(*Stokes.*)

Brandy-and-egg Mixture for Infants.—Beat up well the yolk of a raw egg; ten drops of brandy; one teaspoonful of cinnamon water; one coffeespoonful of white sugar.—(*Louis Starr.*)

Cold Egg-nog.—Beat up an egg; add to it two teaspoonfuls of sugar, a glassful of milk, and a tablespoonful of brandy or good whisky; mix thoroughly.

Hot Egg-nog.—Beat up the yolk of one egg; add a teaspoonful or two of sugar and a glassful of hot milk; strain, and add a tablespoonful of brandy or old whisky, or flavor with nutmeg or wine.

Egg Broth.—Beat up an egg, and add to it half a teaspoonful of sugar and a pinch of salt; over this pour a glass of hot milk and serve immediately. Hot water, broth, soup, or tea may be used in place of milk.—(*Drexel Institute.*)

Egg Cordial.—Beat up the white of an egg until light; add a tablespoonful of cream and beat up together, then add two teaspoonfuls of sugar and a tablespoonful of brandy.

Caudle.—Beat up an egg to a froth; add a wineglassful of sherry wine, and sweeten with a teaspoonful of sugar; if desired, flavor with lemon peel. Stir this mixture into a half-pint of gruel; over this grate a little nutmeg and serve with hot toast.

Albumin Water.—Beat the white of one egg until very light and strain through a clean napkin. Add six ounces of water. If intended for an infant a pinch of salt may be added. A teaspoonful or more of sugar and a teaspoonful or more of lemon juice, orange juice, or sherry wine may be added to enhance its palatableness. This drink may also conveniently be made by placing all the ingredients in a lemonade-shaker, shaking until thoroughly mixed, and then straining. Serve cold.

Apple Water.—Pour a cupful of boiling water over two mashed baked apples; cool, strain, and sweeten. Serve with shaved ice if desired.

Tamarind Water.—Pour a cupful of boiling water over a tablespoonful of preserved tamarinds; allow this to stand until cool, then strain, and serve with shaved ice.

Currant Juice.—Take an ounce of currant juice or a tablespoonful of currant jelly. Over this pour a cupful of boiling water—use cold water with the juice—and sweeten to taste.

Lemonade No. 1.—Take the juice of one lemon or three tablespoonfuls of lemon juice; add from one to three tablespoonfuls of sugar and a cupful (6 ounces) of cold water. Serve with cracked or shaved ice if desired.

Lemonade No. 2.—Pare the rind from one lemon, cut the lemon into slices, and place both in a pitcher with an ounce of sugar. Over this pour a pint of boiling water and let it stand until cold. Strain and serve with cracked ice.—(*Pavy.*)

Effervescing Lemonade.—This may be made by using a carbonated water or by adding half a teaspoonful of bicarbonate of soda or potash to a glassful of either of the foregoing lemonades.

Albuminized Lemonade.—Shake together a cupful of water, two teaspoonfuls of lemon juice, two teaspoonfuls of sugar, and the white of one egg. Serve at once.

Orangeade.—Cut the rind from one orange; over the rind pour a cupful of boiling water; then add the juice of the orange and a tablespoonful of sugar; cool, strain, and serve with shaved ice if desired. If this is too sweet, a teaspoonful of lemon juice may be added.

Imperial Drink.—Add a teaspoonful of cream of tartar to a pint of boiling water; into this squeeze the juice of half a lemon, or more if desired; sweeten to taste and serve cold. This drink is most useful in fevers and in nephritis.

Flaxseed Tea.—Add six tablespoonfuls of flaxseed to a quart of water; boil for half an hour; cool, strain, sweeten, and if desired flavor with a little lemon juice.

Linseed Tea.—To a pint of water add two tablespoonfuls of linseed, the juice of half a lemon, $\frac{1}{4}$ ounce of bruised licorice root (or a piece of licorice the size of a filbert), and rock-candy to taste. Boil for one and one-half hours and strain.—(*Yeo.*)

Orgeat.—Blanch two ounces of sweet almonds and four bitter almond seeds. Add a little orange-flower water and pound into a paste; rub this with a pint of milk diluted with a pint of water until it forms an emulsion. Strain and sweeten with sugar. (A demulcent and nutritive drink).—(*Pavy.*)

Mulled Wine.—One-fourth of a cupful of hot water, one-half inch of stick cinnamon, two cloves, a tiny bit of nutmeg, one-half cupful of port (heated), two tablespoonfuls of sugar. Boil all the ingredients except the wine and sugar for ten minutes; then add the wine and sugar, strain, and serve very hot.—(*Drexel Institute.*)

Grape Juice.—Pluck Concord grapes from the stem. Wash and heat them, stirring constantly. When the skins have been broken, pour the fruit into a jelly bag and press slightly. Measure the juice and add one-quarter the quantity of sugar. Boil the juice and sugar together and then pour into hot bottles; cork and seal with paraffin or equal parts of shoemaker's wax and resin melted together. Less sugar may be uesd.—(*Drexel Institute.*)

Oatmeal, Barley, or Rice Water.—**From the grain**: Use two tablespoonfuls of grain to a quart of water. The grain should have been previously soaked overnight or at least for a few hours. When required for

an emergency, the soaking may be dispensed with and the grain boiled for five minutes instead. The water in which the grain was soaked should be poured off and fresh water added before cooking. The grain should be boiled for several hours, water being added from time to time to keep the quantity up to a quart. Strain. This makes a somewhat thin, watery gruel.

From prepared flours: Various brands of prepared grain flours are on the market, such, for example, as Robinson's Barley Flour. These are all somewhat similar in preparation. From two rounded teaspoonfuls to a tablespoonful of the prepared flour is added to a pint of boiling water, and this is boiled for from fifteen to thirty minutes and then strained. No previous soaking is required.

CEREALS AND CEREAL GRUELS.

Either the grain itself or the specially prepared flour may be used. When the grains are used they should be spread on a clean table and all foreign substances removed. If the whole grains be used, it is well to wash them, after picking them over, with two or three changes of cold water.

Cereals are best cooked in a double boiler. The lower part should be filled about one-third full of water, and, if more is added during the cooking, it should always be boiling hot. The cereal should be cooked over the fire for ten or fifteen minutes. The water should be boiled first and then salted. The cereal is added gradually and the whole stirred to prevent it from burning. It should then be placed in the double boiler and steamed until thoroughly cooked. Cereals, like other starchy foods, require thorough cooking. Most recipes allow too short a time. Oatmeal especially should be mentioned. It

develops a better flavor if cooked for three hours or more, and is better when it is prepared the day before and reheated when used. It should be just thin enough to pour when taken out of the boiler, and when cooled should form a thin jelly.

Any cereal mush may be thinned with water, milk or cream and made into a gruel, or the gruel may be made directly from the grain or flour. Gruels should be thin, *not too sweet* nor too highly flavored, and served very hot. Milk gruels should be made in a double boiler. Gruels may be made more nutritious by the addition of whipped egg, either the white or yolk or both, and the various concentrated food products.

When cereal flours are used, the flour should be rubbed to a smooth paste with a little cold water and added slowly to boiling water, stirring constantly until it is thoroughly mixed.

LENGTH OF TIME TO COOK CEREALS.

Cornmeal mush:	Boil	10	minutes,	then	steam	for	3	hours	or more.
Oatmeal:	"	"	"	"	"	"	1½	"	"
Irish oatmeal:	"	"	"	"	"	"	8	"	"
Wheatena:	"	"	"	"	"	"	1½	"	"
Gluten mush:	"	30	"						
Steamed rice:	Steam for one hour.								
Boiled rice:	Boil for twenty minutes or until soft.								

Arrowroot Gruel.—Dissolve half a teaspoonful of sugar and a quarter of a teaspoonful of salt in a cupful of water, and heat. Mix half a tablespoonful of arrowroot flour with a little water and add to the heated water. Boil for twenty minutes, stirring constantly; then add a cupful of milk, bring to a boil, strain, and serve hot.

Barley Gruel.—Proceed as above, using a tablespoonful of Robinson's Barley Flour instead of arrowroot.

Oatmeal Gruel.—As above, but use oatmeal, and boil for half an hour or longer before adding the milk.

Flour Gruel.—Proceed as in making arrowroot gruel, using instead a tablespoonful of wheat flour. Flavor with lemon juice, cinnamon, nutmeg or vanilla.

Farina Gruel.—Proceed as in making arrowroot gruel, using instead a tablespoonful of farina, and boil but ten minutes before adding the milk.

Imperial Granum Gruel.—As in the preceding, but use imperial granum instead of farina.

Cracker Gruel No. 1.—Use two tablespoonfuls of cracker crumbs and proceed as above. Cook only two or three minutes and do not strain.

Cracker Gruel No. 2.—Brown the crackers, and reduce to a powder by means of a rolling-pin. Add three tablespoonfuls of the powdered crackers to half a cupful of milk and half a cupful of boiling water; cook for ten minutes; then add one-fourth of a teaspoonful of salt and serve.—(*Drexel Institute.*)

Racahout des Arabes.—This is a French preparation with a chocolate flavor which makes a most delicious gruel. Follow the directions given for farina gruel.

Flour Ball.—Tie half a pint of flour in a square of fine cheese cloth, making a very tight ball. Place this in a pot of boiling water and cook for four or five hours. After taking out of the cloth, peel off the outside and grate the hard ball. Dry in the oven and keep in a covered jar. This is useful for making gruels for diluting milk for infants.

Flour-ball Gruel.—Proceed as for arrowroot gruel, using two teaspoonfuls of the above grated flour rubbed up in cold water, and stir into a pint of boiling water. Cook this for ten minutes.

Cornmeal Gruel No. 1.—Use two tablespoonfuls of cornmeal and one of flour, a teaspoonful each of sugar and salt, one quart of hot water and a cupful of milk. Proceed as in making arrowroot gruel, boiling in a double boiler for three hours.

Cornmeal Gruel No. 2.—Take a tablespoonful of cornmeal and moisten with a little cold water. Stir this into a pint of boiling water to which a pinch of salt has been added. Cook for three hours in a double boiler, or for thirty minutes directly over the fire. In the latter case it must be stirred constantly.

Gluten Gruel.—Mix a tablespoonful of gluten flour with one-fourth of a cupful of cold water and stir this into one cupful of boiling salted water. Cook directly over the fire for fifteen minutes; then add one clove and cook over boiling water for a half-hour.—(*Drexel Institute.*)

Barley or Oatmeal Jelly.—**From the grain**: Prepare the grain as directed for barley water. Use from four to six tablespoonfuls of grain to the quart of water. Boil thoroughly for several hours until the grain is thoroughly cooked. Strain and cool. The jelly when hot should be just thick enough to pour.

From the prepared flours: Use two tablespoonfuls of the flour to a pint of water. Boil from fifteen to thirty minutes and strain.

Partially Digested Cereals Prepared at the Table.—To a sauce of well-cooked oatmeal, wheaten grits, or rice, at the customary temperature, add one or two teaspoonfuls of Fairchild's Diastasic Essence of Pancreas, or fifteen grains of Fairchild's Dry Extract of Pancreas. Stir for a few minutes before eating. When the

ferments are added to very hot foods their power becomes impaired.

Tapioca Jelly.—Soak a cupful of tapioca of the best quality in a pint of cold water for two hours; when soft, place in a saucepan with sugar, the rind and juice of one lemon, a pinch of salt, and another pint of water; stir the mixture until it boils; turn into a mold and set away to cool; if desired, a glassful of wine may be added.—(*Bartholow.*)

Tapioca Soup.—Boil a pint of meat broth or stock, and, while stirring constantly, sprinkle in $\frac{3}{4}$ ounce of previously washed tapioca. Cover the saucepan, and let it stand until the tapioca is quite soft. Skim and serve.—(*Yeo.*)

Chestnut Puree.—One pound of chestnuts are peeled, and boiled in water until the second (inside) skin comes off easily. The chestnuts are placed in a sieve until all the water drains off. They are then washed in a dish and afterward pressed through a sieve. Melt three ounces of butter in a stewpan on the fire, add a little salt and sugar—enough to cover the point of a knife—and then the chestnuts. Stew them for half an hour, stirring frequently; pour in enough bouillon so that the mush does not get too thick.—(*Wegele.*)

BREAD.

Drexel Institute Bread Recipe.—For two loaves take two cupfuls of warm milk or water, two teaspoonfuls of salt and two of sugar, a tablespoonful of lard or butter, one-half cake of compressed yeast, and about four pounds of flour. Put the water or milk, salt, sugar, and fat into a bowl. Dissolve the yeast in warm water; add it and the flour gradually; when stiff enough to handle,

turn the dough on a floured board and knead until soft and elastic. Put it back into the bowl, and let it rise in a warm place until it is double its bulk. Then divide into loaves or shape into biscuits. Allow these to rise in the pan in which they are to be baked. Cover the bread and again allow it to double its bulk. Bake loaves one hour in a hot oven. The large amount of yeast allows the bread to be made and baked in three hours.

Brown Bread.—Take one-half cupful scalded milk, one-half cupful water, one teaspoonful salt, one-half tablespoonful butter, one-half tablespoonful lard, two tablespoonfuls of molasses, one-half cupful white flour, sufficient Graham flour to knead, and three-quarters of a yeast cake dissolved in one-quarter of a cupful of lukewarm water. Prepare the same as white bread. Instead of Graham flour, equal parts of Graham flour and white flour may be used in kneading.

Nut-brown Bread.—The same as preceding, with one cupful of nuts chopped and added.

Whole-wheat Bread.—Dissolve a quarter of a yeast cake in a tablespoonful of lukewarm water. Pour half a cupful of hot water over half a cupful of milk, and when lukewarm add the yeast and half a teaspoonful of salt. To this add a cupful of whole-wheat flour and beat for five minutes. Cover and allow this to stand in a warm place for two hours and a half. Then add whole-wheat flour gradually, mixing the mass until it can be kneaded. Knead until elastic; shape and place into baking-pans. Cover and allow to stand in a warm place until it doubles its bulk. Prick the top with a fork and bake for one hour. The oven should not be hot as for white bread.

Pulled Bread.—Use bread made with water. Make

into long loaves, and as soon as baked take off the crust. Pull into stick-shaped pieces and brown slightly in a slow oven.

VEGETABLES.

TIME-TABLE FOR COOKING VEGETABLES IN WATER.
(DREXEL INSTITUTE.)

Potatoes	25–30 min.	Spinach	30–45 min.
Carrots	35–45 "	Celery	20–30 "
Turnips	45 "	Parsnips	30–45 "
Beets (young)	45 "	Green peas	30–40 "
Beets (old)	3–4 hrs.	String-beans	1–3 hrs.
Tomatoes	1–3 "	Lima beans	1 hr. or more.
Onions	45–60 min.	Green corn	12–20 min.
Cabbage	45–60 "	Rice	20–45 "
Cauliflower	20–30 "	Macaroni	45–60 "
Asparagus	20–30 "		

GENERAL RULES FOR COOKING VEGETABLES.

Wash thoroughly; pare or scrape if skins must be removed. Stand in cold water until cooked, to keep them crisp and prevent their being discolored. Cook in boiling water; the water must be kept at the boiling-point. Use two teaspoonfuls of salt with two quarts of water; put the salt into the water when the vegetables are partially cooked. The water in which vegetables are cooked is called vegetable stock.

Fresh green vegetables require less water than others.

Cabbage, cauliflower, onions, and turnips should be cooked uncovered in a large amount of water.

All vegetables must be drained as soon as tender. Season with salt and pepper and serve hot with butter or sauce.

The color may be kept in green vegetables, such as spinach, by pouring cold water through them after draining.

Cold vegetables may be used for salads or may be

placed in a baking-dish with one-half the quantity of sauce (2 cupfuls vegetables and 1 cupful sauce), covered with buttered crumbs, and browned in a hot oven.

Sauce for Vegetables:

3 tablespoonfuls of butter.	White pepper.
3 tablespoonfuls of flour.	1 cupful of milk.
1 teaspoonful of salt.	1 cupful of stock.

SOUPS WITHOUT MEAT.

(DREXEL INSTITUTE.)

These soups are thickened by using butter and flour; this prevents a separation of the thicker and thinner parts of the soup. The butter should be heated until it bubbles, the flour and seasoning added, and enough of the hot liquid to make a smooth sauce thin enough to pour easily; this should be poured into the rest of the hot liquid and cooked in a double boiler until the soup is of the proper consistence.

In soups made of dried peas and beans soda is used to soften the casein; it is also used in tomatoes to neutralize the acid. These soups must be served in hot dishes as soon as ready. Crisp crackers, croutons, or soup sticks may be served with them.

Crisp Crackers:

Split and butter thick crackers and brown in a hot oven.

Cream-of-Tomato Soup:

1 can tomatoes.	1/3 cupful of flour.
1/4 teaspoonful soda.	3 1/4 teaspoonfuls of salt.
1/3 cupful of butter.	1/2 teaspoonful of white pepper.

1 quart of milk.

Stew the tomatoes slowly one-half to one hour, strain, and add soda while hot; make a white sauce and add the tomato juice. Serve immediately.

Cream-of-Celery Soup:

1½ cupfuls of celery.	2 tablespoonfuls of butter.
1 pint of water.	½ cupful of flour.
1 cupful of milk.	½ teaspoonful of salt.
1 cupful of cream.	⅛ teaspoonful of white pepper.

Cook the celery in the boiling water until very soft; strain and add the hot liquid; make a white sauce and cook until it is thick cream.

Cream-of-Potato Soup:

3 potatoes.	Yolks of 2 eggs.
2 cupfuls of milk.	1 teaspoonful of salt.
½ cupful of cream.	Pepper.

½ teaspoonful of onion juice.

Cook the potatoes until soft, drain, mash, add the hot liquid, and strain; add the beaten yolks and seasoning. Cook in a double boiler until the egg thickens, stirring constantly. Serve immediately.

Oyster Stew:

1 cupful of milk.	¼ teaspoonful of salt.
1 pint of oysters.	1 tablespoonful of butter.

Pepper.

Heat the milk. Cook and strain the oyster juice. Add the oysters, which have been rinsed, and cook until the edges curl. Add seasoning, butter, and hot milk. Serve at once. This soup may be thickened with a tablespoonful of flour cooked in the butter as for white sauce.

MILK PREPARATIONS.

Partially Peptonized Milk.—Into a clean granite-ware or porcelain-lined saucepan place one pint of milk, four ounces of water, and the contents of one of Fairchild's peptonizing tubes, or five grains of pancreas extract and fifteen grains of bicarbonate of soda. Heat gradually until it boils, stirring constantly. Boil gently for ten minutes, strain into a clean bottle, cork, and keep in a cool place. Before using shake the bottle well; serve hot or cold. Prepared in this way it will not become bitter.

Peptonized Milk.—Cold Process.—Mix milk, water, and peptonizing agents as directed in the preceding recipe, and immediately place the bottle on ice. Use when ordinary milk is required. This is particularly suited for dyspeptics and individuals with whom milk does not, as a rule, agree. The flavor of the milk remains unchanged..

Peptonized Milk.—Warm Process.—Put in a glass jar one pint of milk and four ounces of cold water; add five grains of extract of pancreas and fifteen grains of bicarbonate of soda. After mixing thoroughly, place the jar in water as hot as can be borne by the hand (about 115° F.). This should be heated for from six to twenty minutes. At the end of this time it may be placed upon ice until required. The contents of one of Fairchild's peptonizing tubes may be used in place of the pancreas extract. If the milk is to be kept for any length of time, it should be brought to a boil, to prevent the formation of too much peptone, which renders the milk bitter.

Hot Peptonized Milk.—Mix together the usual peptonizing ingredients and add a pint of fresh cold milk; after thoroughly shaking the bottle, place it on ice. When needed pour out the required amount, heat it, and drink it as hot as it can agreeably be taken. If required for immediate use, the ingredients may be mixed together in a saucepan and slowly heated to the proper temperature.

Effervescent Peptonized Milk.—Put some finely cracked ice in a glass; fill it half-full of Apollinaris, Vichy, or siphon water, and immediately add the peptonized milk. Drink while effervescing. Brandy may be added if desired.

Specially Peptonized Milk.—This is to be used in

the preparation of jellies, punches, and all recipes where the milk is to be mixed with fruit juices or acids. Prepare according to the hot process; keep the milk at a temperature of 115° F. for one hour; pour into a saucepan and bring to a boil. If required hot, this may be used immediately, or it may be set aside on ice, to be used later. If not heated for an hour, the milk will curdle on being mixed with an acid. If not boiled, the peptonizing ferment will digest gelatin and prevent the formation of jelly.

Peptonized Milk Jelly.—Soak well half a box of Cox's gelatin in four ounces of water. Take one pint of hot *specially* peptonized milk and add four ounces of sugar. Put in the gelatin and stir until it is dissolved. Pare one fresh lemon and one orange, and add the rinds to the mixture. Squeeze the lemon and the orange juice into a glass, strain, and mix with two or three tablespoonfuls of St. Croix rum, or brandy, if preferred. Add the juices to the milk, stirring constantly. Strain, and allow it to cool to the consistence of syrup; when almost ready to set, pour into cups and set in a cold place. Do not pour the milk into molds until the mixture is nearly ready to set, otherwise it will separate in setting.

Peptonized Milk Punch.—In the usual milk punch recipes the *specially* peptonized milk may be used in place of ordinary milk. Take a goblet one-third full of finely crushed ice; pour on it a tablespoonful of rum and a dash of Curacao, or any other liquor agreeable to the taste. Fill the glass with peptonized milk; stir well, sweeten to taste, and grate a little nutmeg on top.

Peptonized Milk Lemonade.—Take a glass one third full of cracked ice; squeeze into this the juice of a

lemon, and add two or three teaspoonfuls of sugar dissolved in water. Fill the glass with fresh *specially* peptonized milk and stir well. If preferred, equal parts of milk and of an effervescent mineral water may be used. Pour the water on the lemon juice and ice, and immediately fill the glass with milk.

Peptonized Milk Gruel.—Mix with a teaspoonful of wheat flour, arrowroot flour, or Robinson's Barley Flour with half a pint of cold water. Boil for five minutes, stirring constantly. Add one pint of cold milk and strain into a jar; add the usual peptonizing ingredients; place in warm water (115° F.) for twenty minutes, and then upon ice.

Junket, or Curds and Whey.—Take a half-pint of fresh milk; add one teaspoonful of Fairchild's Essence of Pepsin and stir just sufficiently to mix. Pour into custard cups, and let it stand until firmly curdled. It may be served plain or with sugar and grated nutmeg. It may be flavored with wine, which should be added before curdling takes place.

Junket with Egg.—Beat one egg to a froth, and sweeten with two teaspoonfuls of white sugar; add this to a half-pint of warm milk; and then add one teaspoonful of essence of pepsin and let it stand until curdled.

Cocoa Junket.—Put an even tablespoonful of any good cocoa and two teaspoonfuls of sugar into a saucepan; scald with two tablespoonfuls of boiling water and rub into a smooth paste; then stir in thoroughly one-half pint of fresh, cool milk; heat this mixture until it is lukewarm—not over 100° F.—then add one teaspoonful of Fairchild's Essence of Pepsin and stir just enough to mix; pour quickly into small cups or glasses, and let it stand until firmly curdled, when the junket is ready for

use. It may be placed on ice and eaten cold; as a dessert it may be served with whipped cream.—(*Fairchild.*)

Coffee Junket.—Dissolve two teaspoonfuls of sugar in two tablespoonfuls of clear, strong coffee; mix this thoroughly with one-half pint of fresh, cool milk; add a teaspoonful of Fairchild's Essence of Pepsin as directed above, and serve in the same way.

Vanilla, Bitter Almond, or Strawberry Junket.—Add the flavoring extract to the cold milk and then prepare in the usual way. A half a teaspoonful of vanilla or bitter-almond extract or a tablespoonful of pure concentrated strawberry syrup should be allowed to a half-pint of milk.

Milk Lemonade.—Take two ounces of sugar, five ounces of boiled milk, one-half lemon, or two ounces of white wine, five ounces of boiling water, and the rind of half a lemon. Pour the boiling water over the peel and the sugar; allow it to cool, add the milk, and then the lemon juice or wine. Strain after ten minutes.

Milk Punch.—Shake together in a lemonade-shaker a glass of milk, a tablespoonful of rum, brandy, or good old whisky, and two teaspoonfuls of sugar. After it has been poured into a glass a little nutmeg may be grated over the top.

Milk Porridge.—Mix a tablespoonful of flour with one-fourth cupful of cold milk and stir into one-fourth cupful of hot milk; if desired, add two raisins cut into quarters. Cook over boiling water for one hour, and add one-quarter teaspoonful of salt just before serving. —(*Drexel Institute.*)

Whey.—Take a half-pint of fresh milk heated lukewarm (115° F.), add one tablespoonful of essence of

pepsin, and stir just enough to mix. When this is firmly coagulated, beat up with a fork until the curd is finely divided and then strain. For flavoring purposes lemon juice or sherry wine may be added.

Cream-of-tartar Whey.—Add a heaping teaspoonful of cream of tartar to a pint of boiling water. Strain, sweeten to taste, and serve cold.—(*Pavy.*)

Wine Whey.—Cook together a cupful of milk and half a cupful of sherry wine. As soon as the curd separates, strain and sweeten. This may be eaten hot or cold.

Lemon Whey.—This is made in the same way as the foregoing recipe, using three tablespoonfuls of lemon juice instead of the wine.

Kumiss No. 1.—Take a quart of skim milk, one-fifth of a cake of yeast, and two tablespoonfuls of sugar. Heat the milk. Dissolve the yeast in a little water and mix it with the sugar and lukewarm milk. Pour the mixture into strong bottles, stopper them tightly with new corks, and tie down the corks with stout twine. Shake the bottles well and place in a refrigerator; this will allow the mixture to ferment slowly. After three days lay the bottles on their sides, turning them occasionally. Five days are required to complete the fermentation; the kumiss is then at its best.—(*Drexel Institute.*)

Kumiss No. 2.—Pour into wired bottles one quart of fresh milk, half an ounce of sugar, a piece of fresh yeast cake half an inch square, and keep at a temperature between 60° and 70° F. for one week, shaking five or six times a day; then put upon ice.—(*Holt.*)

Milk Mixture.—This is made of cream, two parts; milk, one part; lime water, two parts; sugar water,

three parts (seventeen and three-fourths drams of milk sugar to a pint of water).—(*A. V. Meigs.*)

Milk-and-cinnamon Drink.—Add a small amount of cinnamon to the desired quantity of milk and boil it. Sweeten with sugar and add brandy if desired.—(*Ringer.*)

Albuminized Milk.—Shake in a covered jar or lemonade-shaker a cupful of milk, a tablespoonful of lime water, and the white of an egg. Sweeten, flavor as desired, and serve at once.

Milk-and-cereal Waters.—A most valuable method of preparing milk for invalids with whom it disagrees is to mix equal parts of milk and thoroughly cooked barley, rice, oatmeal or arrowroot water and boil them together for ten minutes. This may be served plain, or flavored by cooking with it a cut-up raisin, a sprig of mace, or a piece of stick cinnamon, which should be strained out before serving.

Irish Moss and Milk.—Soak about two tablespoonfuls of Irish moss for five minutes and wash thoroughly in cold water. Add to a cupful of milk and soak for half an hour; then heat slowly, stirring constantly, and then boil for ten minutes, preferably in a double boiler; strain, and pour into cups and cool. This may be served while hot, and may be rendered more nutritious by the addition of the white of an egg stirred into it just before serving.

Milk with Other Diluents.—Milk may be diluted with advantage in many cases by adding lime water, or Vichy, Apollinaris or some other sparkling table water. From one-half to one-eighth the total volume may be added.

EGGS.

Eggs are exceedingly valuable as food for invalids. They should always be fresh. When received they should be washed and then placed in a cool place. They should not be kept with any article of food having an odor, as they absorb such odors and the taste is thereby impaired. Stale eggs will not sink, and if held to a bright light they show a dark spot. The yolk of an egg that has been broken may be kept fresh by placing it (unbroken) in a cupful of cold water. This should be set in a cool place. This will keep it fresh for twenty-four hours or more.

Eggs and all other albuminous food should be cooked at as low temperatures as possible, in order to avoid rendering them tough.

Eggs are best cooked in the shell as follows:

Soft-cooked Eggs.—Place in a pint of boiling water, remove from the fire, and allow to stand for eight or ten minutes. If the egg is very cold to start with, it will take a little longer.

Hard-cooked Eggs.—Place in water, bring to a boil, and then set on the back part of the stove for twenty minutes.

Eggs should be served as soon as cooked, and the dishes should be warmed and ready.

EGGS AND MILK.

Rules for Custards.—The eggs should be thoroughly mixed but not beaten light, the sugar and salt added to these, and the *hot* milk added slowly. Custards must be cooked over moderate heat; if a custard curdles, put it in a pan of cold water and beat until smooth. Custards should always be strained.—(*Drexel Institute.*)

Soft Custard.—Take a pint of milk, the yolks of two eggs, two tablespoonfuls of sugar, and a pinch of salt. Mix all except the milk in a bowl. Heat the milk to the boiling-point and add, stirring constantly. As soon as mixed, pour into the saucepan in which the milk has been heated and cook from three to five minutes, stirring constantly until it thickens. Strain, and pour into a cold bowl, and flavor with from half to one teaspoonful of vanilla, a teaspoonful or more of sherry, or other flavoring material as desired. Custards may be cooked to advantage in a double boiler.

Chocolate Custard.—Melt half an ounce of Baker's chocolate and add to the milk, and proceed as above.

Steamed Custard.—Mix the above, using the whole eggs instead of the yolks. Strain, pour into cups, and steam over boiling water until firm.

Baked Custard.—Proceed as above, but pour the custard into baking-cups. Place the cups in a deep baking-pan and fill the pan nearly as high as the cups with boiling water. Place in the oven and bake twenty minutes or longer, according to the size of the cup. When done a clean knife thrust into the custard comes out clean; if it is not done, it comes out covered with milk.

MEATS.

General Rules for Preparing Meat.—Meat must be weighed, trimmed, and wiped with a damp cloth. It should be removed immediately from the paper in which it was wrapped and placed in a cool place. Only tender cuts of meat should be broiled, pan-broiled, or roasted. When meat is to be cooked by any of these methods, it should first be seared, and then the temperature slightly lowered; by searing, the albumin on the outer surface of

the meat is hardened and the meat is thus cooked in its own juices.

Tough meat should be cooked in water; boiling water hardens the albumin on the outer surface of the meat and prevents the juices from escaping. Meat should be put in boiling water and the water allowed to boil for ten or fifteen minutes; then the cooking should be allowed to proceed at a low temperature until the meat is tender. If the water bubbles, it is too hot. Cooked in this way tough meat will become tender. The time required for roasting or cooking in water varies with the weight and quality of the meat.

For roasts weighing less than 8 pounds allow ten minutes to the pound and ten minutes extra; for those weighing from 8 to 12 pounds, allow twelve minutes to the pound and twelve minutes extra; for those weighing over 12 pounds, allow fifteen minutes to the pound and fifteen minutes extra. For meat weighing less than 10 pounds, to be cooked in water, allow twenty minutes to the pound and twenty minutes extra.

The time required for broiling meat varies with the thickness of the meat.

Stock and broth are prepared by prolonged soaking of the meat in cold water and then cooking it at a low temperature for several hours, allowing it to cool uncovered. The meat that remains after straining may be utilized in various ways, adding a little fresh meat to give it flavor.

The fat must not be removed from stock or broth, for it excludes the air and prevents decomposition. It must, however, be entirely removed before the stock or broth is used; this fat may be used in place of drippings. The trimmings of fat from meat should be clarified. Small

globules of fat may be removed from cold broth with a cloth that has been dipped in boiling water and then wrung dry. Fat may be removed from hot broth by means of tissue-paper or a slice of bread.

Cooking Tender Meats.—*Roasting.*—Skewer the meat into shape. Place it on a rack in a meat pan, into the bottom of which pieces of fat from the meat have been placed. Put in a hot oven on the grate for ten minutes, to sear the meat. If desired it may be seasoned with salt and pepper. Then remove to the floor of the oven and baste every ten minutes, until it is done.

Broiling.—Remove extra fat from the meat and grease the broiler with a part of the fat. Broil over a clear fire; sear, and then turn every ten seconds. Chops one inch thick should be cooked for five minutes. A steak two inches thick should be cooked for ten minutes. Season and serve on a hot platter.

Pan-broiling.—Remove all the fat from the meat. Heat a frying-pan very hot, but use no fat. Sear the meat on both sides, and then cook more slowly until it is done. Stand chops up on their edges to brown. Keep the pan free from fat. The time required for pan-broiling is the same as that required for broiling.—(*Drexel Institute.*)

GENERAL RULES FOR SOUPS.

Both meats and vegetables should be cut into small pieces. The soup should be started with cold water poured over the meats and the heat applied gradually and the soup allowed to simmer, in order to dissolve as much of the nutriment as possible. If heated rapidly the albumin in the meat coagulates, and little but the extractives passes into the soup. The vegetables are added when the soup is nearly done.

Remove the fat by skimming, by using blotting-paper by straining through a cloth wet in cold water, or, best of all, by cooling the soup when all the fat rises to the top, when it can be easily removed.

Clear soups may be rendered more nutritious by the addition of sago or of some cereal, as barley or rice. These may also be added with advantage to many thick soups.

Soups should always be served hot. Soup jellies are served cold, and in hot weather may be substituted for warm soups.

Soups may also be made from soup stocks, which may be prepared in any quantity and kept for several days. Stocks may be made from any meat. Those made from chicken or veal are light in color, and those from beef and mutton somewhat darker. Stocks may also be made by using the bones from any kind of meats.

Soup Stock.—To make stock, use a chicken or several pounds of bones with some meat attached, or a pound of lean meat and one quart of water. Cut-up vegetables may be added as desired. For flavoring add a sprig of parsley and of celery, a peppercorn, a small onion, and a scant teaspoonful of salt. Any of the flavoring vegetables may be omitted as desired or others added. The meat should simmer for several hours, until but half the quantity of water remains. Then add the other ingredients, simmer half an hour longer, strain and cool. Remove the fat.

Soup Stock from Beef Extract.—Cook the other ingredients, except the salt, as given above, for half an hour, using a quart of water. Then add a teaspoonful oı beef extract and a quarter of a teaspoonful of salt.

Soup from Stock.—Rice, tapioca, or whatever is de-

sired is cooked and the stock added, with additional seasoning as thought necessary. Cream, yolks of eggs, Irish moss, cornstarch or arrowroot may be added to render the soup more nutritious.

Chicken Broth.—Take one pound of chicken and a pint of cold water. Clean the fowl, cut it into pieces, and remove the skin. Separate the meat from the bone and chop the meat very fine. Place with the bones—if large, they should be broken—in the water and soak for an hour. Cook over hot water for four or five hours at a temperature of 190° F. Strain and add salt. Water must be added from time to time to keep the quantity up to a pint. Remove the fat. If the broth is to be reheated use a double boiler.

Sweetbread Soup.—The sweetbread is soaked in cold water for one hour, the water being renewed frequently during this time. It is then boiled for one hour in slightly salted water or beef broth, to which one may add one teaspoonful of julienne to improve the taste. After it is soft the sweetbread is taken out of the beef broth and all blood-vessels and skin are removed. It may now be cut into pieces the size of a walnut and put on a plate, over which the beef broth is poured, or the sweetbread may be forced through a sieve, beef broth poured over this, and the whole put on the fire again until it boils, after which the soup may be served. This latter process is to be recommended in the case of dyspeptics. One hundred grams of raw sweetbread generate about 90 calories of heat.—(*Wegele.*)

Meat Broth (Beef, Veal, Mutton, or Chicken).—Cover one pound of chopped lean meat with one pint of water and allow it to stand for from four to six hours. Then cook over a slow fire for an hour until reduced

to half the quantity. Cool, skim, pour into jar and strain.

Veal Broth.—Pour a pint of water on a half-pound of finely chopped lean veal and allow it to stand for three hours. Boil for a few minutes, strain, and season with salt.

Clam or Oyster Juice.—Cut the clams or oysters into pieces and heat for a few minutes in their juice. Strain through muslin and serve while hot. In straining great care must be taken that sand does not pass through the muslin. The juices should be diluted and may be frozen.—(*Drexel Institute.*)

Clam Broth.—Wash three large clams very thoroughly, using a brush for the purpose. Place in a kettle with half a cupful of cold water. Heat over the fire; as soon as the shells open the broth is done. Strain through muslin, season, and serve.—(*Drexel Institute.*)

Mutton Broth with Vegetables.—Allow one pound of neck of mutton to each pint of water; add carrots, turnips, onions, and barley; let all simmer together for three hours.

Mutton Broth without Meat.—Cook two "shank-ends" in a pint of cold water, and vegetables as directed in the foregoing recipe; simmer for three hours and strain.

Beef Tea No. 1.—Cut up a pound of lean beef into pieces the size of dice; put it into a covered jar with two pints of cold water and a pinch of salt. Let it warm gradually and simmer for two hours, care being taken that it does not at any time reach the boiling-point.—(*Yeo.*)

Beef Tea No. 2.—Put a pound of finely mixed beef with a pint of cold water into a suitable vessel. Let it

stand for an hour, stirring occasionally. Put the vessel containing the beef into a saucepan of water, place it over the fire, and allow the water to boil gently for an hour (or the vessel containing the beef tea may be put into an ordinary oven for an hour). Pass the beef tea through a strainer. A fine sediment appears in the fluid, and this should be drunk with the liquid. Flavor with salt. At no time should the beef extract be exposed to a temperature of more than 170° F.—(*Pavy.*)

Beef Tea No. 3.—Chop fine a pound of beef free from fat, tendons, etc., and digest with a pint of cold water for two hours. Let it simmer on the stove for three hours at a temperature never above 160° F. Replace the water lost by evaporation by adding cold water, so that a pint of beef tea shall represent a pound of beef. Strain and carefully express all fluid from the beef.—(*Bartholow.*)

Beef Tea with Oatmeal.—Mix thoroughly one tablespoonful of groats with two of cold water; add to this a pint of boiling beef tea. Boil for ten minutes, stirring constantly, and strain through a coarse sieve.—(*Yeo.*)

Beef Tea, Flavored.—Beef tea may be flavored agreeably by boiling in it a pinch of mixed herbs, a bay-leaf, or a bit of onion, carrot, turnip, or celery and a few peppercorns. The roots should either be chopped small or be scraped to a pulp before being added to the broth. —(*Yeo.*)

Beef Juice.—Broil quickly pieces of the round or sirloin of a size to fit the opening in a lemon squeezer. Both sides of the beef should be scorched quickly to prevent the escape of the juices, but the interior should not be fully cooked. As soon as they are ready the

pieces of meat should be squeezed in a lemon squeezer previously heated by being dipped in hot water. As it drips the juice should be received into a hot wineglass; it should be seasoned to the taste with salt and a little Cayenne pepper, and taken while hot.—(*Bartholow.*)

Cold Beef Juice.—Cover one pound of finely chopped lean beef with eight ounces of cold water and allow it to stand for eight or ten hours. Squeeze out the juice by means of a muslin bag; season with salt or sherry wine and drink cold or slightly warmed. It may be added to milk, care being taken that the milk be not too hot before the juice is added.

Iced Meat Extract.—Cut into pieces the size of a hand one kilo of fresh beef; wrap in a coarse, lattice-like linen bag, put under a lever press, and press slowly. The juice should be caught in a porcelain dish. This is done best by a druggist. By this method about 500 gm. of juice are obtained. The juice is mixed with 250 gm. of sugar, 200 gm. of freshly expressed lemon juice (this last is best omitted in the case of dyspeptics), and 20 gm. of cognac containing vanilla extract; stir in well the yolks of three eggs; the entire mixture is then placed in a freezer.—(*v. Ziemssen.*)

Raw-meat Juice.—Add to finely minced rump steak cold water, in the proportion of one part of water to four parts of meat. Stir well together, and allow it to stand for half an hour. Forcibly express the juice through muslin, twisting it to get the best results.—(*Cheadle.*)

Succus Carnis (Meat Juice).—Cut up the meat into small bits, arrange in layers separated from one another by coarse linen, and then place in a powerful press. From each kilogram of meat about 230 gm. of a blood-red juice are obtained. This contains about 6 per cent. of

albuminates. Its taste is similar to that of raw meat; its flavor may be improved by the addition of salt and beef tea not hot enough to coagulate the albumin.—(*Pettenkoffer and Voit.*)

Beef Essence.—Chop up very fine a pound of lean beef free from fat and skin; add a little salt, and put into an earthen jar with a lid; fasten up the edges with a thick paste, such as is used for roasting venison in, and place the jar in the oven for three or four hours. Strain through a coarse sieve, and give the patient two or three tablespoonfuls at a time.—(*Yeo.*)

American Bouillon (American Broth).—Place in a tin vessel that can be sealed hermetically alternate layers of finely minced meat and vegetables. Seal it, and keep it heated in a water bath (bain marie) for six or seven hours, and then express the broth.—(*Yeo.*)

Bottle Bouillon.—Cut beef, free from fat, into squares. Place these in a stoppered bottle, put the bottle in a basin of warm water, heat slowly, and boil for twenty minutes. There will be about an ounce of yellowish or brownish fluid for each three-quarters of a pound of meat used. The flavor is that of concentrated bouillon.—(*Uffelmann.*)

Peptonized Oysters.—To half a dozen oysters with their juice add half a pint of water and boil for a few minutes. Pour off the broth and set it aside. Mince the oysters, and with the aid of a potato-masher reduce to the consistence of a paste. Place this with the broth in a glass jar and add fifteen grains each of extract of pancreas and of bicarbonate of soda and mix. Allow this to stand in hot water (115° F.) for one and one-half hours. Pour into a saucepan and add half a pint of milk; heat over a slow fire to boiling-point. Flavor with salt

and pepper and serve hot. Let the heating be done gradually, and be careful to bring the mixture to a boil before taking it from the fire.—(*Fairchild.*)

Peptonized Beef.—Cover one-fourth of a pound of finely minced lean beef (or beef and chicken mixed) with half a pint of cold water. Cook over a slow fire until it has boiled for a few minutes, stirring constantly. Pour off the broth and rub or pound the meat to a paste. Put meat and broth and half a pint of cold water in a glass jar, and add twenty grains of extract of pancreas and fifteen grains of bicarbonate of soda. Mix well and keep in a warm place—at about 110°–115° F.—or place it in warm water and allow it to stand three hours, stirring or shaking occasionally. Boil quickly; strain or clarify with the white of an egg and season with salt and pepper. If desired, it need not be strained, as the small particles of meat are usually easily digested. Cereals may be added, boiling with half the amount of water previously directed, and mixing all together before peptonizing. At the end of three hours the mixture must be boiled or it will spoil.—(*Fairchild.*)

METHODS OF PREPARING RAW BEEF.

Meat given raw should always be perfectly fresh and very finely divided. Scrape the meat with a sharp knife, which will separate the coarser fibers. If the resulting mass is stringy, pass through a fine sieve. This may be seasoned with salt and pepper, and served on toast, crackers, or bread and butter. It may be rolled into small balls and swallowed. These may be flavored as desired. They may also be slightly browned by rolling about rapidly in a hot saucepan, care being taken not to change any but the outside of the ball, and that but

slightly. Scraped beef may be served as a liquid or semi-solid food. Mix it with an equal quantity of cold water until it is quite smooth. Place in a double boiler and cook until thoroughly heated, stirring constantly. Add a little salt and pepper and serve at once. This may be made thicker by adding less water.

Raw Meat with Milk and Sugar.—Scrape half a pound of rump steak with a knife until all the pulp is removed; sweeten with sugar, breaking the lumps of sugar with the meat in a basin with a small wooden spoon. Add slowly as much milk as will make it about the thickness of arrowroot; flavor with brandy. If any fiber of the meat remains, strain through a gravy strainer. The mixture should be perfectly smooth.—(*Ringer.*)

Raw-beef Soup.—This is made by chopping up one pound of raw beef and placing it in a bottle with one pint of water and five drops of strong hydrochloric acid. This mixture is allowed to stand on the ice overnight, and in the morning the bottle is placed in a pan of water at 110° F., and kept at about this temperature for two hours. It is then placed in a stout cloth and strained until the mass that remains is almost dry. The filtrate is given in three portions daily. If the taste of the raw meat is objectionable, the meat may quickly be roasted on one side and the process completed in the manner previously described.—(*Weir Mitchell.*)

PANOPEPTON.

Iced Panopepton.—To a small glass half full of clean crushed ice add one tablespoonful of *Panopepton;* let this stand for a minute and then sip slowly.

Panopepton Jelly.—This is made of one ounce of fresh celery cut into small pieces, one-half of a small box

of the best gelatin, one-fourth of a teaspoonful of salt, two dashes of pepper, six tablespoonfuls of *Panopepton*, and two cupfuls of cold water. Soak the gelatin in half a cupful of cold water for one hour; put the water and celery in a double boiler on the fire and simmer for one-half hour; add the salt, pepper, and soaked gelatin and stir until it is dissolved; remove from the fire and add the *Panopepton;* stir and strain through linen into a jelly bag and set near ice. Serve in small quantities.

Panopepton Jelly with Orange.—The articles required are one-half of a small box of the best gelatin, one tablespoonful of sugar, six tablespoonfuls of *Panopepton*, the juice and rind of one orange, and one pint of cold water. Put the gelatin, orange peel (cut in small pieces), orange juice, and cold water in a dish and let it stand for one hour, then put in a double boiler over the fire, add the sugar, and stir until it is dissolved; now strain through linen, add the *Panopepton*, and stir well. Pour into a jelly jar and set near the ice. Serve in small quantities.

Panopepton Hot.—To a small teacup two-thirds full of boiling water add one tablespoonful of *Panopepton* and one teaspoonful of *fresh* lemon juice; a little sugar may be added if desired. Stir and drink immediately, sipping slowly.

Panopepton Bouillon Hot.—Put one tablespoonful of *Panopepton* in a small teacup; fill the cup nearly full of boiling water, and flavor to taste with celery salt or plain salt and pepper; stir and sip slowly.

Panopepton Cordial.—Put into a cordial glass or any small glass two teaspoonfuls of clean crushed ice; add one teaspoonful of Fairchild's Essence of Pepsin and three teaspoonfuls of *Panopepton.* Sip slowly. This is

a good after-dinner cordial for those who suffer discomfort after eating.

Panopepton with Whey.—Put into a small teacup one or two teaspoonfuls of clean crushed ice; add one tablespoonful of *Panopepton*, stir, and then fill the cup with whey. Drink slowly.

Egg Gruel.—Take one cupful of hot beef broth made with "Soluble Beef," one egg, and one-half teaspoonful of salt. Beat the white and the yolk of the egg separately; add the hot beef broth gradually to the yolk, stirring continually. Whip the white to a stiff, dry froth with the salt, and beat it into the hot broth. Return to the double boiler and reheat. Serve very hot.

Barley Gruel with Beef Extract.—One-half teaspoonful of "Soluble Beef," two cupfuls of hot water, one tablespoonful of barley flour, one saltspoonful of salt. Dissolve the beef in the hot water, and mix the flour and salt together with a little cold water. Pour the boiling stock on the flour and cook for ten minutes. Strain and serve very hot.

Beef Broth with Poached Egg.—Prepare the broth in the proportion of half a teaspoonful of "Soluble Beef" to one cupful of hot water and add a poached egg.

A Nutritive Drink for Delicate Women and Children.—This is made by mixing one-fourth to one-half teaspoonful of "Soluble Beef," five ounces of boiling water, and one-half ounce of cream; season with salt and pepper to suit the taste.

Beef Broth with Grain.—Take one teaspoonful of "Soluble Beef," one quart of water, one tablespoonful of rice, and salt to taste. Dissolve the "Soluble Beef" in the hot water, and add the well-washed rice. Simmer

slowly until dissolved and absorbed by the rice, adding more beef broth if too much boils away. If not entirely dissolved, the broth should be strained before using.

Beef-tea Egg-nog.—This requires one-eighth teaspoonful of "Soluble Beef," one-half cupful of hot water, one tablespoonful of brandy, and a pinch of salt. Beat the egg slightly, and add the salt and sugar. Dissolve the "Soluble Beef" in the hot water, add to the egg, and strain. Mix thoroughly, adding wine, and serve.

MEAT JELLIES WITHOUT GELATIN.

Chicken Jelly.—Half a grown chicken should be well pounded, and boiled in one quart of water for two hours until only a pint remains; season and strain. Serve hot or place on ice, where it will "jel."

Veal-bone Jelly.—Place ten pounds of veal bones and ten quarts of water or weak bouillon over the fire and bring to just a boil. Skim and add two pounds of barley and a little salt. Simmer for five or six hours and then strain. If too thick, dilute, before serving, with bouillon. Stir in the yolk of an egg in a cup and serve.

Meat Jelly.—This is made by cooking good boneless, lean beef on a water bath with a little water for sixteen hours or until it becomes gelatinized. Of the artificial preparations on the market for making bouillon, the most reliable is Liebig's Extract of Meat (10 : 250 gm.) or Cibil's Bouillon (1 teaspoonful to 250 gm.). Inaglio's bouillon capsules are also very convenient. If it is desired to make the bouillon more nutritious, one teaspoonful of meat peptone may be added.—(*Hepp.*)

Jelly for Dyspeptics.—Remove the skin and meat from one calf's foot; wash the bones and place in cold water on the stove; when it begins to foam, skim off the

refuse which gathers on top. After rinsing off the scum with cold water, put the bones into a pot with one-quarter kilo of beef or half an old hen, one-quarter liter of water, and 5 gm. of salt, and boil slowly for from four to five hours. Pour the jelly thus formed through a fine sieve, and place overnight in a cellar. Next morning remove the fat, and clarify the cold jelly by adding one egg with its shell mashed, beating and stirring steadily. Then, with the addition of a little cornstarch, subject the whole to a temperature not over 60° R., or the white of the egg will curdle. Constantly beat and stir. If the jelly begins to get grainy, cover and let it cool until the white of the egg becomes flaky and separates. Then strain again several times until it becomes perfectly clear; add 5 gm. of extract of meat, pour the jelly into a mold, and let it cool again. The gravy from a roast may be utilized and is very palatable. It must be stirred in while the mass is still warm and liquid. This jelly is usually relished with cold fowl, but spoils easily in summer; it must therefore be kept on ice.—(*Weil.*)

Dishes Made with Gelatin.—Gelatin should be soaked in cold water for about half an hour to soften it. It may then be easily dissolved by adding boiling water. If it is desired to soften gelatin quickly, it should be placed in cold water and gradually heated over boiling water until it dissolves. If a jelly is to be strained, a wet cloth should be used for the purpose. Jelly molds should be wet with cold water before being filled. When granulated gelatin is used, much smaller amounts are required than when the ordinary form is used.

Wine Jelly.—Soak a teaspoonful of granulated gelatin in two tablespoonfuls of cold water and half a cupful of hot water. Add two tablespoonfuls of sugar and half a

teaspoonful of lemon juice, and when cooling add two tablespoonfuls of wine.—(*Drexel Institute.*)

Lemon jelly is made in the same manner as the wine jelly just described, using a tablespoonful of lemon juice in place of the quantity directed.

Orange jelly is made in a similar manner, using two teaspoonfuls of lemon juice, four tablespoonfuls of orange juice, and three tablespoonfuls of sugar, but a little less of the boiling water.

Coffee jelly is also made similarly, adding an ounce or two of coffee.

Milk Jelly.—Take two quarts of milk and add half a pound of sugar. Boil for five or ten minutes. Cool, and add an ounce of gelatin dissolved in a cupful of cold water. Flavor with the juice of two or three lemons and three glasses of good Bordeaux wine.—(*Schlesinger.*)

Irish-moss Blanc-mange.—Wash a tablespoonful of Irish moss in several changes of water and pick it over carefully. Place it in a double boiler together with half a cupful of milk. Cook until it thickens when dropped on a cold plate. Add salt, strain, and flavor. Pour into a custard cup that has first been rinsed in cold water.—(*Drexel Institute.*)

Meat Jellies with Gelatin.—Use any kind of meat broth desired, but always one with an appetizing flavor. Add a teaspoonful of granulated gelatin to enough broth to cover it, and allow the gelatin to soak for a few minutes. Then add the remainder of a cupful of the broth very hot and stir until the gelatin is dissolved. Strain, and pour into molds to cool.

Meat Jellies with Tapioca.—Mix a cupful of broth as above with four level tablespoonfuls of powdered tapioca. Heat until quite clear, stirring con-

stantly. Add salt and season as desired. Pour into molds and cool.

Meat Jellies with Irish Moss.—Wash two tablespoonfuls of Irish moss thoroughly. Add this to a cupful of hot broth and allow it to stand for half an hour; then heat slowly, stirring constantly, and boil for ten minutes, preferably in a double boiler. Strain, and pour into molds and cool.

Albuminized Jelly.—Any of the above meat jellies may be rendered more nutritious by the addition of the white of an egg. The egg should be well beaten and stirred into the jelly just after it has been taken off the fire.

RECIPES FOR FOODS FOR DIABETICS.

Gluten Bread.—Mix one pound of gluten flour with three-fourths of a pint or one pint of water at 85° F. (With some of the prepared flours—Bishop's, for example—no yeast is required.) As soon as the dough is mixed put it into tins and place them immediately in the oven, which should be at a temperature of about 430° F. Or the dough may be made into small dinner rolls and baked on flat tins. The loaves take about one and one-half hours to bake, and the rolls three-fourths of an hour. Either are easily made. The addition of a little salt improves the bread.

When any special brand of flour is used, the directions that accompany it should be followed closely.

Gluten Pudding.—A batter of eggs, cream, and gluten flour is prepared. This is flavored with lemon or other essences and baked.

Gluten Pancakes.—Add gluten flour to one or two eggs and beat into a batter. The pancakes may be

sweetened with a little saccharin or eaten with glycerin. (*Williamson.*)

Jeffries' Gluten Biscuit.—Mix thoroughly gluten flour, one cupful; best bran, previously scalded, one cupful; baking-powder, one teaspoonful; salt to taste; two eggs; milk or water, one cupful.

Diabetic Bread.—Take one quart of set milk or milk and water, one heaping teaspoonful of good butter, one-fifth of a cake of compressed yeast beaten up with a little water, and two well-beaten eggs. Stir in gluten flour until a soft dough is formed; knead as in making ordinary bread; place in pans to raise, and when light bake in a hot oven.—(*James Stewart.*)

Camplin's Bran Cakes.—Take a sufficient quantity—say a quart—of wheat bran, boil it in two successive waters for a quarter of an hour, each time straining it through a sieve; then wash it well with cold water (on the sieve) until the water runs off perfectly clear; squeeze the bran through a cloth as dry as possible, and then spread it thinly on a dish; place it in a slow oven; if put in at night, let it remain until the morning, when, if perfectly dry and crisp, it will be ready for grinding. The bran thus prepared must be ground in a mill, and sifted through a wire sieve that has so fine a mesh that a brush must be used to pass it through; that which remains in the sieve must be reground until it becomes quite soft and fine. Take of this bran powder three ounces (some patients use four ounces); the other ingredients are as follows: three new-laid eggs; one and one-half or, if desired, two ounces of butter; about half a pint of milk. Mix the eggs with a little of the milk, and warm the butter with the remainder; then stir the whole well together, adding a little nutmeg or ginger or

any other agreeable spice. Bake in small tins (patty pans), which must be well buttered, in a somewhat quick oven for about half an hour. When baked, the cakes should be a little thicker than a captain's biscuit; they may be eaten with meat or cheese for breakfast, dinner, or supper. At tea they require a somewhat liberal allowance of butter, or they may be eaten with curd or with any soft cheese. It is important that the flour be prepared as directed above. If the cakes do not keep well or if they have not been well prepared, place them before the fire for ten minutes every day.

Almond Pudding.—Take two eggs, one-quarter of a pound of almond flour, one-quarter of a pound of butter, and three tabloids of saccharin dissolved in a tablespoonful of brandy. Warm the butter, beat in the almond flour and the yolks of the eggs, and add the dissolved saccharin. Whip the whites into a stiff froth, and beat all together. Put into dariole molds and bake in a quick oven; serve with a little hot sauce made with dry sherry and saccharin.—(*Mrs. Hart.*)

Almond Biscuit.—To each ounce of almond flour add the whites of two eggs and salt to taste. Whip the whites to a stiff froth, add the almond flour, and beat well together. Put in buttered patty pans and bake in a moderately quick oven for from fifteen to twenty minutes. The whole must be done quickly, and baked as soon as the ingredients are mixed. This biscuit is a useful substitute for bread.—(*Mrs. Hart.*)

Almond Cakes No. 1.—Take one pound of ground almonds, four eggs, two tablespoonfuls of milk, a pinch of salt. Beat up the eggs, and stir in the almond flour; place in twelve flat tins and bake in a moderate oven for about fifteen minutes.—(*Saundby.*)

Almond Cakes No. 2.—Break up about one-quarter of a pound of sweet almonds in a stone mortar (or almond flour may be used). Put the flour into a linen bag, which should then be immersed for one-quarter of an hour in boiling water, acidulated with a little vinegar to remove the small amount of sugar from the almonds. Mix well with three ounces of butter and two eggs. Then the yolks of three eggs and a little salt are added, and the whole stirred briskly for some time. Beat the whites of three eggs to a fine froth and add to the mixture. The paste is then made into biscuits, smeared with butter, and baked with a gentle fire.—(*Seegen.*)

Aleuronat Bread.—Take about six or seven ounces of ordinary wheat flour and the same quantity of aleuronat powder; five ounces of the best butter; one teaspoonful of salt; three-quarters of an ounce of baking-powder. The flour and the aleuronat are mixed in a warm dish, and the melted butter and milk (made lukewarm) are added gradually, followed by the salt, and finally by the baking-powder (one part of sodium carbonate and two parts of cream of tartar). The dough is well mixed, then molded into two loaves, and baked at a good heat.—(*Ebstein.*)

Aleuronat and Almond Cakes.—Three ounces of aleuronat; three ounces of almond flour; beat up one egg, and add about two teaspoonfuls of cream and a little water. Moisten the aleuronat with a little water containing saccharin and let it stand for a few minutes; then add the almond flour, the egg, the cream, and the water just as required to make a light paste. Spread on a tin. Cut into squares, and bake in a moderate oven for twenty minutes.—(*Williamson.*)

Aleuronat Pancakes.—Take one egg and beat it

up in a little water and cream; take two teaspoonfuls of aleuronat powder and half a teaspoonful of baking-powder and a little salt. Mix well, and then add gradually to the egg and cream and beat into a batter; allow it to stand for five minutes. If it is too thick, add a little more cream and water. Fry in an ordinary frying-pan greased with a little lard. At the end of about eight minutes, when the under surface is browned, turn it over and continue to bake it for five minutes longer.—(*Williamson.*)

Aleuronat and Suet Pudding.—This is a palatable and cheap dish. To make it take two ounces of aleuronat flour and two ounces of suet, one egg, a pinch of salt, and half a teaspoonful of baking-powder. Sprinkle a little aleuronat flour on a chopping-board and chop the suet on this part of the board. Then mix the remaining aleuronat with the suet in a dishpan. Add the salt and the baking-powder. Beat up the egg in about three tablespoonfuls of water to which a little saccharin has been added. Add the egg gradually to this mixture, rubbing the whole mass well into a paste. It may be necessary to add a little more water. Drop into a tin pudding mold smeared with butter or lard, float it in a pan of water, and boil for two hours, taking care that the boiling water does not get into the mold; or, better still, the pudding may be baked in the oven. Its taste is improved by the addition of half an ounce of almonds. A small quantity of red wine may serve as a sauce.—(*Williamson.*)

Cocoanut Pancakes.—Beat up one egg in two tablespoonfuls of milk, or, better, in a little cream and water, and add a pinch of salt. Then add two tablespoonfuls of cocoanut powder (freed from sugar). Allow this to

stand for from five to ten minutes. Add a little more cream and water. Mix well until it is a little thicker than ordinary pancake batter. Put a little lard in the frying-pan and heat until the lard is just melted; then drop in half of the mixture. Allow this to remain over a moderate fire for a few minutes—about five—until the under surface is brown; then turn the cake over and heat for another five minutes. The other half of the mixture may be used for the second pancake.—(*Williamson.*)

Cocoanut Cakes.—Mix three tablespoonfuls of cocoanut powder into a paste with a little German yeast and water. The mixture should be allowed to remain by the fire or in a warm place for about twenty minutes, or until fermentation occurs and it becomes "puffy." Then add a small quantity of a watery solution of saccharin. Beat up one egg, and add this with two teaspoonfuls of cream and a little water to the cocoanut paste. The whole should be well mixed, dropped into small tins, and baked in an oven for about thirty minutes.—(*Williamson.*)

Cocoanut and Almond Cakes.—To make these, the following ingredients are required: Three-quarters of a pound of the finest cocoanut powder, one-quarter of a pound of ground almonds, six eggs, and half a cupful of milk. Beat up the eggs and stir in the cocoanut and almond flour. Divide into sixteen flat tins, and bake for twenty-five minutes in a moderate oven.—(*Saundby.*)

Cocoanut Pudding.—Take three tablespoonfuls of cocoanut powder, mix with a little water and German yeast, and keep for twenty minutes in a warm place, so as to allow the small quantity of sugar present to decompose; add four tablespoonfuls of cream, one egg, a little

salt, and half a pint of water sweetened with saccharin. Mix into a paste. Place in a dish greased with butter. Cook like rice pudding, in a slow oven for thirty minutes.—(*Williamson.*)

Light Custard.—Beat up well one egg; make a mixture of cream and water and boil; gradually add the boiled cream and water, while hot, to the egg, stirring with a spoon. Then place the mixture in a pan over the fire, and stir constantly until it becomes thick; then pour into a glass. It is important that the mixture should not be heated too much—*i. e.*, that it be not boiled—as the albumin would be coagulated. Flavor with cinnamon and sweeten with saxin or saccharin if desired.

Cheese Cakes.—Take one pint of milk, half a tablespoonful of rennet, one ounce of butter, two eggs, one tablespoonful of brandy, one-quarter of an ounce of almonds, and a little saccharin. Curdle the milk, and let it stand in a warm place until thoroughly set; tie a piece of muslin over a bowl and pour the milk over the muslin; let it stand until all the whey has been strained off. Beat the curd smooth, and add the butter and egg, well beaten, with the brandy, almonds, and saccharin. When well mixed pour into patty pans and bake for fifteen or twenty minutes.—(*Mrs. Hart.*)

Stewed Lettuce.—A well-grown head of lettuce should be selected. Boil this in plenty of water, taking care not to let it fall to pieces. When nearly done take it out of the water, drain, and place in a stewpan with a little rich brown gravy and allow it to simmer for twenty minutes.

Inulin Biscuit.—Put 50 gm. (1½ oz.) of inulin in a large porcelain basin, place this over a hot-water bath, and with 30 c.c. (1 oz.) of milk and as much hot water

as may be necessary, rub up into a smooth dough, into which the yolks of four eggs and a little salt have been mixed. To this add the whites of the four eggs, having first beaten them to a foam, and working them in carefully. Bake in tin molds smeared with butter. The taste of the biscuit may be improved by adding vanilla or other flavoring extract. Inulin is too expensive to be used by the average patient.

Peanut Flour.—This contains about 25 per cent. of carbohydrates. The peanut kernels should be boiled in water for half an hour to extract a portion of the oil which they contain. They should then be dried, and rolled into fine particles with a rolling-pin. Place the kernels in boiling water acidulated with tartaric acid or vinegar, in order (1) to extract saccharin elements; (2) overcome the taste and odor of the peanut; (3) to prevent emulsification of the remaining oil. When they have been thoroughly boiled in acidulated water, the ground kernels should be subjected to dry heat and then rolled into a fine flour. This flour may be made into a form of porridge with milk; bread and biscuits may also be baked from it; and it may be made into the form of a German pancake.—(*Stern.*)

Home-made Substitute for Bread.—Beat up thoroughly six eggs; add a teaspoonful of baking-powder or its chemical equivalent, and one-quarter of a teaspoonful of salt, and beat again. Pour this mixture into hot waffle-irons smeared with butter, and bake in a very hot oven. By way of variety almonds (powdered) may be added. These biscuits may be eaten hot with butter and cheese.

Sugar-free Milk for Diabetic Feeding.—Take 1 liter of skim milk, heat to a temperature of 30° C., and

add 10 c.c. of glacial acetic acid, diluted with 100 c.c. of water. Mix, and allow the mixture to stand for about fifteen minutes. Collect the separated casein, and let it drain on very fine muslin, using no pressure. Remove the casein to a mortar, rub into a smooth paste, add ½ liter of distilled water, and strain as before. Repeat this washing of the casein twice. Transfer to a mortar, rub until quite smooth, and add 2½ gm. of potassium hydrate dissolved in 100 c.c. of water (or as much of the potassium hydrate as is necessary to make the product just alkaline to phenolphthalein). Add 100 gm. of ordinary Devonshire clotted cream, 5 gm. of gelatin, previously dissolved, 0.06 gm. (1 gr.) of saccharin, and water, at about 38° C., up to 1 liter. Lastly, strain through fine muslin.—(*Hutchison.*)

Soy Bean Cookery.[1]—In diabetes the beans may be added to the diet simply to give variety, and they may also be used to great advantage in connection with an otherwise carbohydrate-free diet, particularly in those cases in which the sugar percentage is high, and it is with these cases we have had particular success.

The simplest way to use the beans is to cook them like the ordinary navy bean, preparing either bean soup, boiled beans, or baked beans, the flavor usually being rather improved by the addition of a piece of fat salt meat. It is also a good plan to soak the beans for eight or ten hours, stir them up, and remove the rather firm envelope which encloses them, most of which will be found to come to the surface, from which they may be easily skimmed off. The beans may be boiled and reduced to a smooth gruel and used in this way as a gruel, although this is rather a troublesome process; or the beans may

[1] Ruhräh, *Medical Record*, Sept. 23, 1911.

be thoroughly boiled and mashed and may be flavored with some other vegetable, particularly stewed tomatoes. The soy bean flour may be utilized in many ways.

Gruels.—A quart of gruel is made by boiling from 1 level tablespoonful to 6 ounces of the soy flour (made by the Cereo Company, Tappan, N. Y.) in 1 quart of water for fifteen minutes, adding water to make up for the loss of evaporation. Salt should be added to taste.

	Protein.	Fat.	Carbohydrates.
1 level tablespoonful to quart	0.35	0.15	0.08
1 ounce 4 (tablespoonfuls) to quart . .	1.40	0.60	0.30

These gruels do not thicken during cooking, as they contain no starch, and readily settle on standing. This may be overcome by adding 1 to 2 heaping teaspoonfuls of barley, oat, or wheat gruel flour before cooking, which will add 0.6 to 1.2 per cent. starch to the gruels, and also slightly increase the percentage of protein.

Broths.—Add 1 to 8 ounces of the flour to 1 quart of beef, mutton, veal, or chicken broth and boil for fifteen minutes, adding water to make up for loss of evaporation; or, boil the same quantity of the soy flour for one hour with 1 quart of water, to which has been added a piece of ham, bacon, or salt pork to give flavor. Each ounce of the flour will add to the broth about 13 grams of protein and 120 calories, or in percentage add 1.4 per cent. protein, 0.6 per cent. fat, and 0.30 per cent. carbohydrates. A broth made with 6 ounces of the soy flour to the quart would be half as rich in protein and fat as steak.

Muffins.—To make muffins from the soy flour, take 1¼ teacupfuls of the soy flour, ¼ teacupful of wheat flour, ½ teaspoonful of salt, 2 eggs, 1 teacupful of sweet milk, 2 rounded teaspoonfuls of baking powder, and 1½ tablespoonfuls of melted but not hot butter. Beat well to-

gether, adding the melted butter last, and bake in gem pans in a hot oven. This will make about 12 muffins which contain about 150 grams of protein, and which will yield about 1800 calories, of which the carbohydrates produce but 280. Inasmuch as the soy flour contains no starch, the addition of some wheat flour in making muffins is required. The mixture of wheat and soy flour in this formula will contain about 36 per cent. protein and 20 per cent. carbohydrates, against 14 per cent. protein and 60 to 70 per cent. carbohydrates in gluten flour. The proportion of protein to carbohydrates is eight to ten times as large in the mixed soy and wheat flour as in the gluten flour.

In addition to these methods, the following recipe for muffins has been suggested by Dr. Skinner, of New Haven, Conn.: Soy bean flour, 1½ cupfuls; salt, ½ teaspoonful; baking powder, 2 even teaspoonfuls. Mix well and add 2 tablespoonfuls of cream which has first been thoroughly stirred into a cup of cold water. Add 2 eggs and beat together. Then add 2 tablespoonfuls of melted butter and beat the whole mixture well together. Bake fifteen minutes in a heated gem pan. The above makes 15 muffins.

Another recipe for muffins is to beat up 3 eggs, add 1 cup of milk in which 1 grain of saccharin has been dissolved, and a lump of butter the size of an egg. Enough of the bean flour should be added to make a batter with ½ teaspoonful of baking powder. This should be baked in buttered muffin pans.

Nut-cakes.—These may be made by using the above muffin recipe as a basis and adding chopped nuts, almonds, or any other kind desired; and the flour is improved by the addition of a small amount of spice.

Soy Bean Cakes.—These may be made by taking 1 tablespoonful of cocoa, 1 teaspoonful of cinnamon, 1 teaspoonful of allspice, and chopped nuts, adding them to the batter as prepared for the muffins.

Breakfast Food.—As a breakfast food it may be utilized by taking 1 cup of flour, enough milk or water to moisten it into a paste, a pinch of salt, and 1 grain of saccharin, which should be dissolved before adding. Boil one and a half hours in a double boiler and serve with rich cream.

Pancakes.—These may be made by beating up 2 eggs with a pinch of salt, adding enough meal to make a batter, and ¼ teaspoonful of baking powder. This should be fried with butter and made into small cakes.

Soy Bean Cheese.—In China and Japan the bean is used chiefly in the form of a cheese-like substance, the most common forms of this being natto, tofu, miso, yuba, and shoyu. These cheeses are eaten daily by almost all the inhabitants of the East, but they are said to have a lack of flavor that renders them more or less unsuited for European and American palates. In Seattle, Wash., and other places in the West we are informed that tofu is made by the Japanese and sold to the Oriental residents. We have not had any personal experience so far with the bean cheeses, although they are evidently very easy to manufacture. One may be made from the gruel which resembles somewhat curds and whey, but which in the only form we have tried is not sufficiently palatable for use, although very slight flavoring might make it a valuable food for American use.

CHAPTER XXIII.

CUTS OF MEAT.[1]

THE methods of cutting sides of beef, veal, mutton, and pork into parts, and the terms used for the different "cuts," as these parts are commonly called, vary in

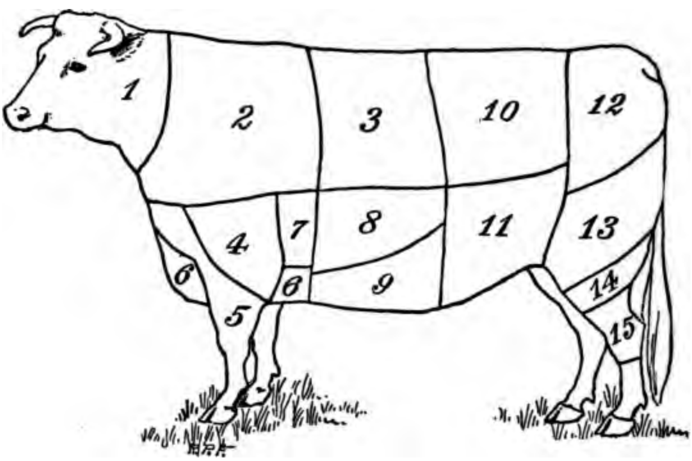
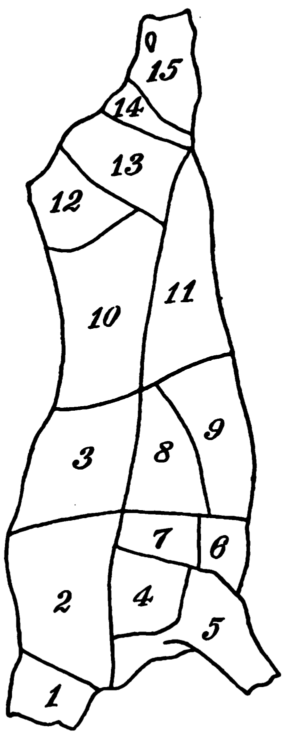


FIG. 5.—Diagrams of cuts of beef: 1, Neck; 2, chuck; 3, ribs; 4, shoulder-clod; 5, fore-shank; 6, brisket; 7, cross-ribs; 8, plate; 9, navel; 10, loin; 11, flank; 12, rump; 13, round; 14, second-cut round; 15, hind-shank.—(Atwater and Bryant, *Bulletin No. 28*, Office of Experiment Stations, United States Department of Agriculture.)

different localities. The analyses here reported apply to cuts as indicated by the following diagrams. These show the positions of the different cuts, both in the live animal

[1] This section is quoted from Atwater and Bryant, *Bulletin No. 28*, Office of Experiment Stations, United States Department of Agriculture.

and in the dressed carcass as found in the markets. The lines of division between the different cuts will vary slightly, according to the usage of the local market, even where the general method of cutting is as here indicated. The names of the same cuts likewise vary in different parts of the country.

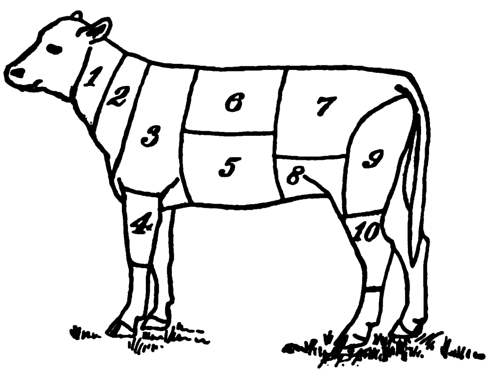


Cuts of Beef.—The general method of cutting up a side of beef is illustrated in Fig. 5, which shows the relative position of the cuts in the animal and in a dressed side. The neck piece is frequently cut so as to include more of the chuck than is represented by the diagrams. The shoulder-clod is usually cut without bone, while the shoulder (not included in diagram) would include more or less of the shoulder blade and of the upper end of the fore-shank. Shoulder steak is cut from the chuck. In many localities the plate is made to include all the parts of the fore-quarter designated on the diagrams as brisket, cross-ribs, plate, and navel, and different portions of the plate, as thus cut, are spoken of as the "brisket end of plate" and "navel end of plate." This part of the animal is largely used for corning. The ribs are frequently divided into first, second, and third cuts, the

latter lying nearest the chuck and being slightly less desirable than the former. The chuck is sometimes subdivided in a similar manner, the third cut of the chuck being nearest the neck. The names applied to different portions of the loin vary considerably in different localities. The part nearest the ribs is frequently called "small end of loin" or "short steak." The other end of the loin is called "hip sirloin" or "sirloin." Between the short steak and the sirloin is a portion quite generally called the "tenderloin," for the reason that the real tenderloin, the very tender strip of meat lying inside the loin, is found most fully developed in this cut. Porterhouse steak is a term most frequently applied either to the short steak or the tenderloin. It is not uncommon to find the flank cut so as to include more of the loin than is indicated in the figures, in which case the upper portion is called "flank steak." The larger part of the flank is, however, very frequently corned, as is also the case with the rump. In some markets the rump is cut so as to include a portion of the loin, which is then sold as "rump steak." The portion of the round on the inside of the leg is regarded as more tender than that on the outside, and is frequently preferred to the latter. As the leg lies upon the butcher's table, this inside of the round is usually on the upper or top side, and is therefore called "top round." Occasionally the plate is called the "rattle."

Cuts of Veal.—The method of cutting up a side of veal differs considerably from that employed with beef. This is illustrated by Fig. 6, which shows the relative position of the cuts in the animal and a dressed side. The chuck is much smaller in proportion, and frequently no distinction is made between the chuck and the neck.

The chuck is often cut so as to include considerable of the portion here designated as shoulder, following more nearly the method adopted for subdividing beef. The shoulder of veal as here indicated includes, besides the portion corresponding to the shoulder in beef, the larger part of what is here classed as chuck in the adult animal. The under part of the fore-quarter, corresponding to the plate in the beef, is often designated as breast in the veal. The part



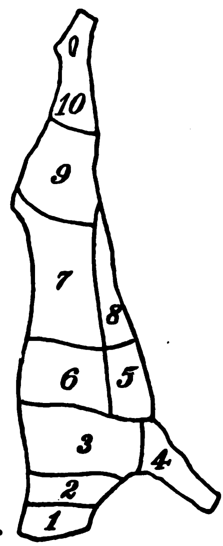
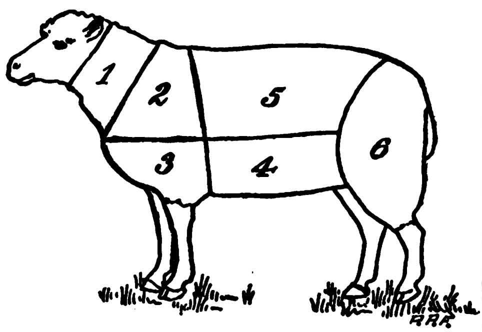


FIG. 6.—Diagrams of cuts of veal: 1, Neck; 2, chuck; 3, shoulder; 4, fore-shank; 5. breast; 6, ribs; 7, loin; 8, flank; 9, leg; 10, hind-shank.—(Atwater and Bryant, *Bulletin No. 28*, Office of Experiment Stations, United States Department of Agriculture.)

of the veal corresponding to the rump of beef is here included with the loin, but is often cut to form part of the leg. In many localities the fore- and hind-shanks of veal are called the "knuckles."

Cuts of Lamb and Mutton.—Fig. 7 shows the relative position of the cuts in a dressed side of mutton or lamb and in a live animal. The cuts in a side of lamb and mutton number but six, three in each quarter. The

chuck includes the ribs as far as the end of the shoulder blades, beyond which comes the loin. The flank is made to include all the under side of the animal. Some butchers, however, make a large number of cuts in the fore-quarter, including a portion of the cuts marked "loin" and "chuck" in Fig. 7, to make a cut designated as "rib," and a portion of the "flank" and "shoulder" to make a cut designated as "brisket." The term "chops" is ordinarily used to designate portions of either the loin,



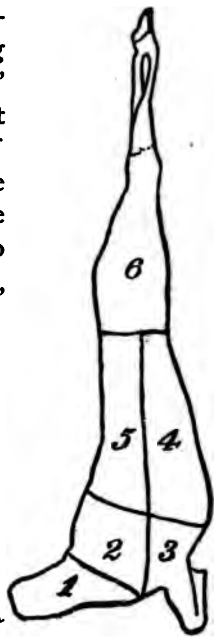


Fig. 7.—Diagrams of cuts of lamb and mutton: 1, Neck; 2, chuck; 3, shoulder; 4, flank; 5, loin; 6, leg.—(Atwater and Bryant, *Bulletin No. 28*, Office of Experiment Stations, United States Department of Agriculture.)

ribs, chuck or shoulder, which are either cut or "chopped" by the butcher into pieces suitable for frying or boiling. The chuck and ribs are sometimes called the "rack."

Cuts of Pork.—The method of cutting up a side of pork differs considerably from that employed with other meats. A large portion of the carcass of a dressed pig consists of almost clear fat. This furnishes

the cuts which are used for "salt pork" and bacon. Fig. 8 illustrates a common method of cutting up pork, show-

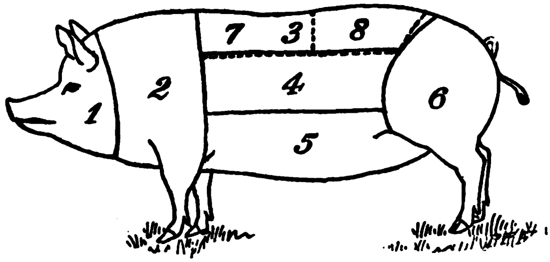
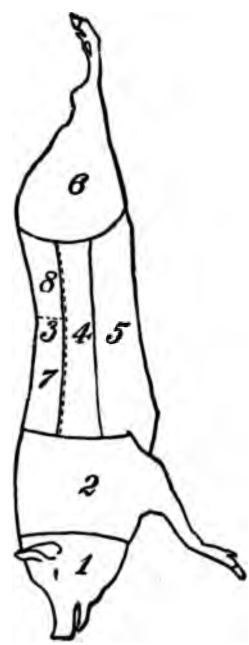


FIG. 8.—Diagrams of cuts of pork: 1, Head; 2, shoulder; 3, back; 4, middle cut; 5, belly; 6, ham; 7, ribs; 8, loin.—(Atwater and Bryant, *Bulletin No. 28*, Office of Experiment Stations, United States Department of Agriculture.)

ing the relative position of the cuts in the animal and in the dressed side. The cut designated as "back cut" is almost clear fat, and is used for salting and pickling. The "middle cut" is the portion quite generally used for bacon and for "lean ends" of salt pork. The belly is salted or pickled or may be made into sausages.



Beneath the "back cut" are the ribs and loin, from which are obtained "spare ribs," "chops," and roasting-pieces, here designated by dotted lines. The hams and shoulders are more frequently cured, but are also sold as fresh pork "steak." The tenderloin proper is a comparatively lean and very small strip of meat lying under the bones of the loin and usually weighing a fraction of a pound. Some fat is

usually trimmed off from the hams and shoulders, which is called "ham and shoulder fat," and is often used for sausages, etc. What is called "leaf lard," at least in some localities, comes from the inside of the back. It is the kidney fat.

As stated above, cuts as shown in the diagrams herewith correspond to those of which analyses are reported in the tables beyond, but do not attempt to show the different methods of cutting followed in markets in different parts of the United States.

WEIGHTS AND MEASURES.

Relative Values of Apothecaries' and Metric Fluid Measures.

Minims.	Cubic centimeters.	Minims.	Cubic centimeters.	Fluid-ounces.	Cubic centimeters.	Fluid-ounces.	Cubic centimeters.
1 =	0.06	30 =	1.90	1 =	30.00	21 =	621.00
2 =	0.12	35 =	2.16	2 =	59.20	22 =	650.00
3 =	0.18	40 =	2.50	3 =	89.00	24 =	710.00
4 =	0.24	45 =	2.80	4 =	118.40	25 =	740.00
5 =	0.30	50 =	3.08	5 =	148.00	26 =	769.00
6 =	0.36	55 =	3.40	6 =	178.00	27 =	798.07
7 =	0.42			7 =	207.00	28 =	828.80
8 =	0.50	Fluid-drams.		8 =	236.00	30 =	887.25
9 =	0.55			9 =	266.00	31 =	917.00
10 =	0.60	1 =	3.75	10 =	295.70	32 =	946.00
11 =	0.68	1¼ =	4.65	12 =	355.00	48 =	1419.00
12 =	0.74	1½ =	5.60	13 =	385.00	56 =	1655.00
13 =	0.80	1¾ =	6.51	14 =	414.00	64 =	1892.00
14 =	0.85	2 =	7.50	15 =	444.00	72 =	2128.00
15 =	0.92	3 =	11.25	16 =	473.11	80 =	2365.00
16 =	1.00	4 =	15.00	17 =	503.00	96 =	2839.00
17 =	1.05	5 =	18.50	18 =	532.00	112 =	3312.00
18 =	1.12	6 =	22.50	19 =	591.50	128 =	3785.00
19 =	1.17	7 =	26.00				
20 =	1.25						
25 =	1.54						

Relative Values of Metric Fluid and Apothecaries' Measures.

Cubic centimeters.	Fluid-ounces.	Cubic centimeters.	Fluid-ounces.	Cubic centimeters.	Fluid-drams.	Cubic centimeters.	Minims.
1000 =	33.81	400 =	13.53	25 =	6.76	4 =	64.80
900 =	30.43	300 =	10.14	10 =	2.71	3 =	48.60
800 =	27.05	200 =	6.76	9 =	2.43	2 =	32.40
700 =	23.67	100 =	3.38	8 =	2.16	1 =	16.23
600 =	20.29	75 =	2.53	7 =	1.89	0.50 =	8.11
500 =	16.90	50 =	1.69	6 =	1.62	0.25 =	4.06
473 =	16.00	30 =	1.01	5 =	1.35	0.06 =	1.00

Relative Values of Avoirdupois and Metric Weights.

Avoir. ounces.	Grams.	Avoir. ounces.	Grams.	Avoir. ounces.	Grams.	Avoir. pounds.	Grams.
1/16 =	1.772	5 =	141.75	13 =	368.54	3 =	1360.78
1/8 =	3.544	6 =	170.10	14 =	396.90	4 =	1814.37
1/4 =	7.088	7 =	198.45	15 =	425.25	5 =	2267.55
1/2 =	14.175	8 =	226.80	Avoir.		6 =	2721.55
1 =	28.350	9 =	255.15	pounds.		7 =	3175.14
2 =	56.700	10 =	283.50	1.0 =	453.60	8 =	3628.74
3 =	85.050	11 =	311.84	2.0 =	907.18	9 =	4082.33
4 =	113.400	12 =	340.20	2.2 =	1000.00	10 =	4535.92

Relative Values of Metric and Avoirdupois Weights.

Gm.	Ounces.	Gr.	Gm.	Ounces.	Gr.	Gm.	Ounces.	Gr.	Gm.	Ounces.	Gr.
28.35 =	1		38 =	1 +	149	125 =	4 +	179	600 =	21 +	72
29.00 =	1 +	10	39 =	1 +	164	150 =	5 +	127	650 =	22 +	405
30.00 =	1 +	25	40 =	1 +	180	200 =	7 +	24	700 =	24 +	303
32.00 =	1 +	56	50 =	1 +	334	250 =	8 +	358	750 =	26 +	198
33.00 =	1 +	72	60 =	2 +	50	300 =	10 +	255	800 =	28 +	96
34.00 =	1 +	87	70 =	2 +	205	350 =	12 +	152	850 =	29 +	429
35.00 =	1 +	103	80 =	2 +	300	400 =	14 +	48	900 =	31 +	326
36.00 =	1 +	118	85 =	3		500 =	17 +	279	950 =	33 +	222
37.00 =	1 +	133	100 =	3 +	230	550 =	19 +	175	1000 =	35 +	120

Relative Values of Apothecaries' and Metric Weights.

Grains.		Grams.	Grains.		Grams.	Drams.		Grams.
1	=	0.0625	24	=	1.55	1	=	3.90
2	=	0.1300	25	=	1.62	2	=	7.80
3	=	0.1950	26	=	1.70	3	=	11.65
4	=	0.2600	27	=	1.75	4	=	15.50
5	=	0.3240	28	=	1.82	5	=	19.40
6	=	0.4000	30	=	1.95	6	=	23.30
7	=	0.4600	32	=	2.10	7	=	27.20
8	=	0.5200	33	=	2.16	Ounces.		
9	=	0.6000	34	=	2.20	1	=	31.10
10	=	0.6500	35	=	2.25	2	=	62.20
11	=	0.7150	36	=	2.30	3	=	93.30
12	=	0.7800	38	=	2.47	4	=	124.40
14	=	0.9070	39	=	2.55	5	=	155.50
15	=	0.9720	40	=	2.73	6	=	186.60
15.5	=	1.0000	44	=	2.86	7	=	217.70
16	=	1.0400	48	=	3.00	8	=	248.80
18	=	1.1600	50	=	3.25	9	=	280.00
20	=	1.3000	52	=	3.40	10	=	311.00
21	=	1.3600	56	=	3.65	48	=	1492.80
22	=	1.4250	58	=	3.75	100	=	3110.40

Relative Values of Metric and Apothecaries' Weights.

Grams.		Grains.	Grams.		Grains.
1	=	15.43	9	=	138.90
2	=	30.86	10	=	154.32
3	=	46.30	100	=	1543.23
4	=	61.73	125	=	1929.04
5	=	77.16	150	=	2374.85
6	=	92.60	175	=	2700.65
7	=	98.02	1000	=	15432.35
8	=	123.46			

INDEX.

NAME	DATE DUE
Hilda Verlinden	Feb 21
Belle B Miller	MAR 30 1922
(Special student in dietetics)	
A. Giebel	OCT 24 1923
E.J. Betterton	Aug. 3
K. Crowder	OCT 2 1929
J.M. MEYERFELD	JUN -7 1932